

8-1
BIENNIAL REPORT
OF THE
DEPARTMENT
OF
CONSERVATION
OF THE
STATE OF LOUISIANA

1906-1907

✓
EIGHTH
BIENNIAL REPORT

OF THE

DEPARTMENT

OF

Louisiana, CONSERVATION, Dept. of

OF THE

STATE OF LOUISIANA

GS
557.63
L



1926 - 1928

PUBLISHED BY THE
DEPARTMENT OF CONSERVATION
126 NEW ORLEANS COURT BUILDING

Personnel

V. K. IRION
Commissioner

LUCY POWELL RUSSELL
Secretary

STANLEY C. ARTHUR
Director, Division of Wild Life

WILSON S. HOLLAND
Director, Division of Enforcement

W. R. HINE
Forester and Director, Division of Forestry

NATHAN D. CANTERBURY
Assistant Forester

WILLIAM P. CHISHOLM
Director, Division of Minerals

JAMES N. McCONNELL
Director, Division of Oysters

PERCY VIOSCA, JR.
Director, Division of Fisheries

BESSIE W. SANDERS
Director, Bureau of Education



New Orleans, May 1, 1928

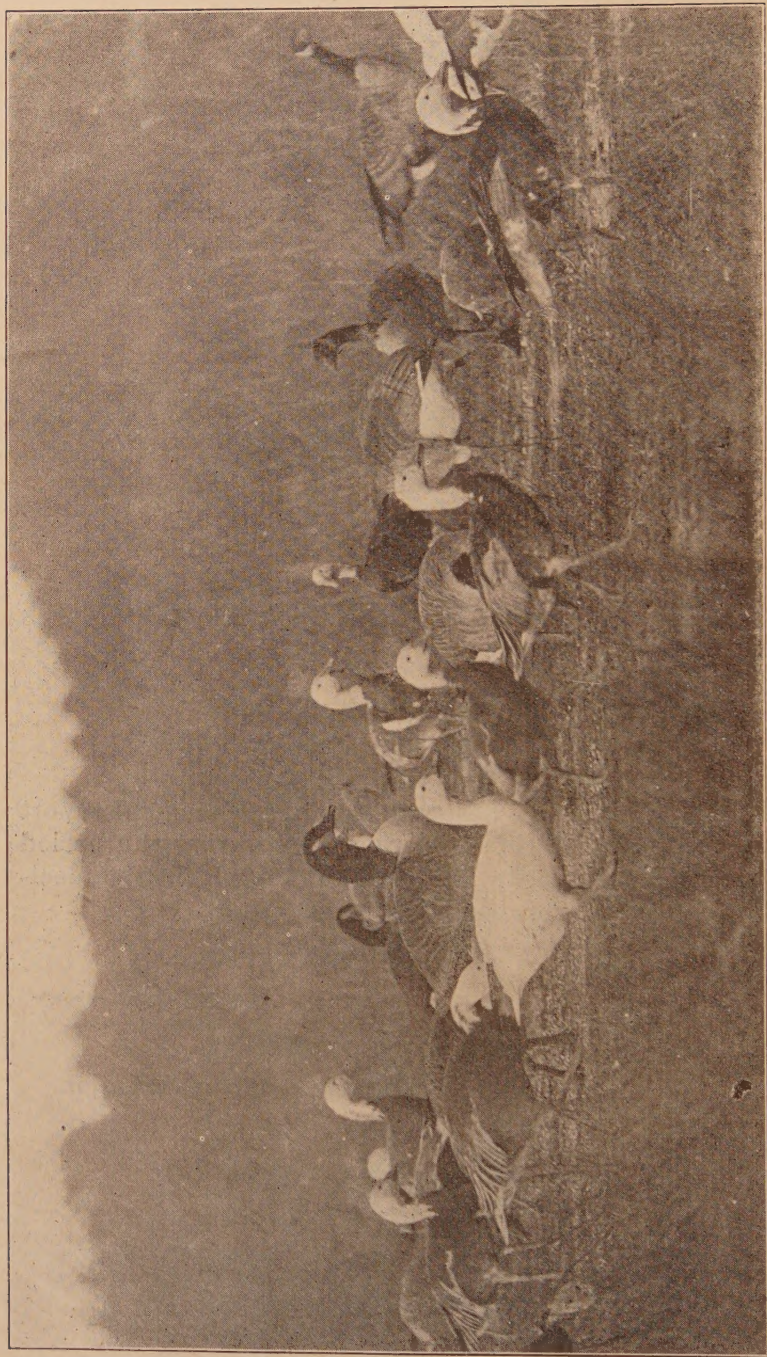
To His Excellency,

The Governor of the State of Louisiana
and Members of the Legislature:

I am presenting herewith the eighth biennial report of the Department of Conservation, covering the period from April 1, 1926, to March 31, 1928, which is respectfully submitted for your consideration.

V. K. Simon

Commissioner of Conservation.



(Photo by Stanley C. Arthur)

Blue, snow, and Canada geese on a gravel bank

Report of the Commissioner

In carrying out the purpose for which the Department of Conservation was created, namely the protection of the State's natural resources from undue waste and exploitation, great progress has been made during the past two years, or since the last biennial report was submitted.

By constitutional mandate, the natural resources of our State must be protected, conserved, and replenished, and the Department of Conservation, a department of the state government, is charged with the duty of protecting the State's natural gifts from wasteful use and exploitation. Its duty, however, is not that of mere prohibition; rather is it the department's function to encourage the economic use of those natural gifts which nature has bestowed upon us in such generous measure.

The principles of conservation do not require a miserly hoarding of nature's gifts, but permit of the intelligent use of them. The theory underlying the work of this department is that the present generation may not use up nor destroy the wonderful natural resources which nature has given us, but that this legacy should be protected and replenished so as to insure to our posterity at least some of the benefits which are the natural heritage of generations yet to come as well as our own.

It should be a source of gratification and pride to all patriotic citizens of Louisiana to know that we are leading the Nation in this wonderful work. The Honorable Finis J. Garrett of Tennessee, democratic leader in the lower House of Congress, recently delivered an address before the Will H. Dilg League of Shreveport in the course of which he said, "Federal figures show that Louisiana has made far greater strides in conservation work than any other state in the Union. Louisiana stands first in this work with New York a close second." This does not mean that we are leading in every division of the work, because as a matter of fact

we are behind in some phases due to insufficient funds, but we are steadily forging ahead in these in spite of this handicap.

The department was considerably embarrassed in its work during the past year by Governor Simpson's unwarranted attack upon the department's head. A series of suits were directed against the Commissioner with a view of discrediting him and his administration and bringing about his removal from office, all of which failed in their purpose. This assault necessarily had a more or less demoralizing effect upon the entire personnel of the force and impaired their efficiency to a great extent.

The act which embarrassed us perhaps more than any other was the seizure of our operating funds in the hands of the State Treasurer in an apparent effort to make it appear that the department was unable to meet its obligations. Although our funds were tied up for many months, we were able, by practicing the strictest economy, to carry on in spite of this obstacle, never having defaulted in a single payment.

The incidents referred to involved several important changes in the personnel of the organization, chiefly in the office force, all of which have redounded greatly to the benefit of the service.

Four important pieces of litigation seriously affecting the department were prosecuted during the past year and in each case we have scored a signal victory.

The first of these cases was brought by the Louisiana Fur Dealers Association in an effort to declare unconstitutional that portion of our fur law which gives the department the right to inspect the books of any fur dealer in order to determine whether or not proper and correct reports in accordance with the law were being made to the department. The fur dealers contended that this was an infringement of their rights. We differed with them and they took the matter to the courts. The department won in the civil district court.

They then appealed to the Supreme Court and we won there. The case was then appealed to the United States Supreme Court and we won again, thus setting the question at rest for all times.

The legislature, at its 1926 session, amended our conservation laws so as to prevent non-resident fishermen from taking shrimp and oysters out of Louisiana waters to adjoining states for canning or packing purposes. This was done at the instance of Louisiana packers who contended they were placed at a disadvantage by permitting these natural resources to be diverted for the purpose of building up industries outside of Louisiana.

This change in the law met with very serious opposition from the packers of Biloxi in the State of Mississippi and other points along the gulf coast which had been obtaining raw material from Louisiana territory. This opposition finally culminated in the instigation of two suits in the Federal Court by the Mississippi packers to have this new law declared unconstitutional. The cases were tried in the United States District Court at New Orleans, and we won in both instances, but the Mississippians appealed to the United States Supreme Court where the cases will come up for argument in the near future. We feel confident that final judgment will be in our favor.

The other case known as the sand, gravel, and shell case was initiated by the department against the State Auditor to compel that official to credit the conservation fund with all monies accruing from royalties on sand, gravel, and shells. The Attorney General advised the Auditor that these royalties should go into the general fund. We appealed from this decision to the courts. The case was tried before Judge Favrot at Baton Rouge, who decided against us. We appealed to the Supreme Court and obtained judgment in our favor. This tax is an important source of revenue to the department, aggregating \$15,000 to \$20,000 annually.

ORGANIZATION OF THE DEPARTMENT

The Department of Conservation is directed and controlled by a commissioner, who is appointed by the governor with the advice and consent of the state senate, for a period of four years.

The Commissioner of Conservation, in carrying out his pledge to protect, conserve, and replenish the state's natural resources, has appointed as heads of the various divisions of the work competent and properly equipped directors to superintend and direct the various activities of the department.

The work of the Department of Conservation is conducted through six separate divisions: the Division of Enforcement, the Division of Fish and Fisheries, the Division of Oysters, the Division of Wild Life, the Division of Forestry, and the Division of Minerals. Each of these divisions is directed by technicians who have specialized in the particular work which they are called upon to do.

The department has also established a bureau whose whole attention is given to educating our people in the value of our natural resources and the importance of the principles of conservation. This bureau, called Bureau of Education, is under the direction of a trained teacher.

The accounting system, efficiently conducted by trained accountants, is under the direct supervision of the commissioner and the secretary.

REVENUE

The administration of the work of the Department of Conservation is not a tax upon the general tax payers of the state. Only those who enjoy the special benefits accruing from the taking of the state's natural resources are required to pay a tax. And it is only fair that the moneys so collected, or an adequate proportion thereof, should be devoted to replenishing that which has been taken.

In requiring those who enjoy such benefits to pay

a tax, the state is only keeping faith with the people of the state generally and with the generations yet to come.

Although the Department of Conservation receives from the legislature the authority to spend a given sum each year for the support of its various divisions, it can only spend this allotted amount when it has been collected through the sale of hunting licenses, trapping licenses, commercial fishing licenses, oyster bedding-ground rents, the severance tax on shrimp, oysters, and fur-bearing animals, and the royalties on sand, gravel, and shells.

Therefore, the work carried on by the Department of Conservation is not a tax upon anyone in the state except those who enjoy the special benefits and privileges of taking either the game, the fish, the oysters, or other natural resources.

ENFORCEMENT

One of the most important phases of the department's work is the enforcement of the laws. The expense of guarding the natural resources and policing the vast area of the state and the large system of waterways is possibly the largest single expense the department must bear; the need of funds for carrying on this important branch of the state government's work is self-evident.

The area of Louisiana is 48,706 square miles consisting of 28,000,000 acres; there are 3,397 square miles of water area, 4,794 miles of navigable streams, 35,000 miles of fishing streams, and 2,760 square miles of land-locked bays. The Department of Conservation employs about 60 conservation agents for policing this vast area. It may be readily seen that each agent of the department must be constantly on guard to educate and instruct our citizens regarding the provisions of the laws and the necessity therefor, and to prevent law violations.

The task would present insurmountable difficulties

were it not for the large number of law-abiding citizens who give us whole-hearted cooperation in carrying out the purposes of the laws. The Izaak Walton League and the Will H. Dilg League renders valuable assistance in their advocacy of the principles of conservation and their actual practice of these tenets. Many individual citizens, too, lend individual aid in enforcing the conservation laws, volunteering their services as special agents and serving without remuneration in enforcing the conservation laws.

CONSERVATION FLEET

In order to properly police the bays, lakes, and streams of the state, it is necessary to maintain a number of boats, whose work consists of patrolling the waterways to prevent violations and to see that fishermen, oystermen, trappers, and hunters comply with the conservation laws and regulations, and to collect licenses and other fees due the department. Many of these waterways cannot be reached except by boat as there is no transportation to and from them by common carriers.

The department owns wharf facilities on the New Basin Canal in New Orleans, where all of its boats are kept in good repair. These facilities have been greatly improved during the past year by the addition of new buildings and new equipment, which enables us to handle all repair work expeditiously and efficiently.

The conservation fleet is in better condition at present than ever before in its history. Nevertheless, additional boats are needed, but these are being added gradually as funds become available.

FISHERIES

Since our last biennial report, the department has made very satisfactory progress in the work of the Fisheries Division.

The fish hatchery in Rapides Parish has been en-

larged to more than double its capacity by the addition of larger and better ponds for the propagation of game fish. Over \$5,000 was expended in this improvement, and the hatchery is now equipped with better facilities for restocking the depleted fishing streams of the state.

Several self-supporting, parish-controlled hatcheries are being constructed at the suggestion of the department and will be maintained under the department's direction. A hatchery of this kind is being established on Cane River, in Natchitoches Parish; Lake St. John in Concordia Parish, and Lake Bruin in Tensas Parish. Work on the Lake Bruin hatchery was begun last spring, but was interrupted by the flood; we have only recently resumed operations on this enterprise, but we hope to complete it at an early date.

Provision was made by the Legislature of 1926 for a buffalofish hatchery somewhere in the neighborhood of Jonesville, but the work was retarded because of the flood, and no site has as yet been selected.

One of the most serious problems of the Fisheries Division is the effective control of stream pollution. The discharge of waste from oil field operations, pulp mills, sugar mills, and gravel plants, is a constant menace to the streams in their respective vicinities. It is granted that such industries contribute largely to the development of the natural resources and the consequent prosperity of the state, and natural drainage is a very important factor in the successful operation of such plants. At the same time, the law prohibits the discharge of poisonous substances into the streams, and the problem is to prevent this without inflicting hardship upon important industries.

Considerable progress has been made in this direction, however, during the past year, and we feel very much encouraged by the results so far attained. We are meeting with better support and cooperation than formerly, and this promises an early solution to our problem.

OYSTERS

The Louisiana oyster is unsurpassed for its delicious flavor and nutritious value. It is one of our most popular and wholesome food products and gives New Orleans a prestige among lovers of sea foods which is unrivalled by any other place in the country. The oyster beds of Louisiana are located in remote, uninhabited sections of the state, and are therefore removed from any sewage or other pollution.

The state has the greatest natural foundation for the oyster industry of any state in the Union. The oyster-packing industry has become an important factor in the life of several parishes along the Gulf Coast, and bids fair to increase rapidly in the next few years.

Act 258 of 1926 contained a provision which prohibits the transportation of oysters out of the state for canning or packing in other states. This law was intended to encourage development of the packing industry, but, incidentally it struck a heavy blow to the gulf coast cities of Mississippi, particularly the beautiful and thriving little city of Biloxi. A large number of canning factories are located there, and they have heretofore depended upon the Louisiana oyster reefs to supply them with raw material. This will probably result in closing down many, if not all, of their packing plants. This, of course, is to be regretted. In order to save their industry, if possible, the Biloxi packers brought suit in the Federal courts to nullify the Louisiana statute. This fact is treated under another head.

WILD LIFE

The study of the fur-bearing animals of the state, their commercial importances, reproduction habits, numbers, and related studies is part of the work of the Wild Life Division. This division is also required to collect the taxes and licenses due on furs.

It is the work of this division, also, to make biological researches into all phases of wild bird and ani-

mal life of the state, including game and non-game birds, and game quadrupeds, and fur bearing animals. Important studies of bird migration are being made, a bird census being presently conducted in cooperation with the United States Biological Survey.

Satisfactory progress has been made in the scientific studies made by the Wild Life Division.

FORESTRY DIVISION

The Forestry Division operates under a specific appropriation from the legislature, which comes out of the fund accruing from the severance tax on timber.

The Legislature of 1926 appropriated \$80,000 a year out of the timber severance tax for the support of this division, but the sum is inadequate for this purpose and should at least be doubled. The state could make no better investment of its revenues than in devoting a liberal amount to bringing back our once magnificent forest areas. Prevention and control of forest fires is our most difficult and expensive problem.

In spite of the handicap of insufficient funds, however, Louisiana leads the South in protecting her forests from fire, over one-fourth of the total forested area of the state being under intensive fire protection.

Fifteen lookout towers for the detection of forest fires are now in operation as against two when the present administration took office. There are over 500 miles of telephone lines now in operation for exclusive use by the Forestry Division in forest fire prevention as against 50 miles in operation two and a half years ago. Although Louisiana suffered a disastrous fire season during the latter part of 1927 and the early part of 1928, only three and a half acres in a hundred of the area under state protection was lost.

Louisiana stands twelfth among the states of the Union in the area of protected lands, Maine, New York, New Jersey, Pennsylvania, Michigan, Wisconsin, Minn-

esota, Idaho, Washington, Oregon, and California only leading Louisiana. Louisiana leads all the southern states.

MINERALS

The department receives a specific appropriation of \$100,000 a year for the protection of the oil, the gas, and other minerals resources of the state. The first two mentioned are of vast proportions, the state occupying seventh position among the states of the Union.

This is a most important branch of the department's work, involving the closest supervision of all drilling operations to see that they are carried on in such a way as to conserve the life of the oil and gas fields.

Several new fields have been developed during the past few years, and many serious problems of conservation have confronted the Minerals Division. These situations have, however, been efficiently handled by the trained corps in charge of our Minerals Division.

The department has undertaken, also, through its Minerals Division to develop the clay resources of the state and bring about their economic utilization in the making of pottery, bricks, and tiles. The only moneys available for this purpose, however, are such as can be spared from the funds needed for the protection of our oil and gas fields, and this is necessarily limited. Adequate provision should be made for this very important work, and a statewide geological survey instituted.

EDUCATIONAL WORK

The education of our citizenry as to the value and extent of Louisiana's natural resources is an important phase of the department's work.

The department publishes and distributes, free of charge, bulletins dealing with every activity of its work, and these bulletins are in demand not only by teachers, school children, and the general citizenry of

the state, but by libraries, state departments, and individuals throughout the United States, many requests being received from foreign countries as well.

Lectures are given in the schools throughout the state instructing the children in the love of wild life and instilling in them from early childhood the aesthetic and the economic value of these creatures of the wild.

Exhibits of wild life are shown at the parish fairs throughout the state each fall, with competent lecturers in charge.

ACCOUNTING

The Accounting Division, while heavily handicapped by the extended litigation brought about by the ouster suit against the Commissioner, has successfully met all obstacles, and today the department is in the enviable position of being able to not only meet all obligations but even to discount its bills.

The department would welcome a visit from the Chief Executive and members of the legislature, and invites their inspection of the department's organization, its work, and its properties.

V. K. IRION, Commissioner



"Thou has lived before, live after me,—
Thou ancient, friendly, faithful tree."

Report of the Division of Forestry

STATEMENT OF FOREST POLICY

The prosperity of Louisiana, now and in the future, depends in large measure upon the wise use of her forest lands to the end that they shall become fully productive and that Louisiana shall always have an adequate supply of timber for her industries and homes for her people.

Therefore, the forest policy for Louisiana includes forest protection, equitable taxation of forest lands, reforestation of idle lands not now needed for other agricultural purposes, proper management of immature stands, investigation of forest problems, public ownership of small areas of forest land for demonstration of approved forest practices and for recreation, and a campaign to inform the people of Louisiana of the facts concerning timber growing.

I.

Forest fires are a menace for which the public more than the land owner is responsible. Owners of forest land must be assisted in their efforts to prevent and suppress those forest fires for which they are not responsible.

II.

The growing timber crop presents a problem in taxation because immature stands of timber are an asset on which the owner may not realize a return for several years. Equitable taxation for forest lands would consist of an annual tax on the value of the bare land and a yield tax on the timber at the time of cutting.

III.

Idle lands are a burden to the surrounding lands, since the productive acres must pay an undue share of

the taxes. Reforestation of such lands which are not needed for agriculture would change their status from a liability to an asset.

IV.

The basis of a wise forest policy depends on the investigation of all phases of the forest problem in order that the best forest practices may be developed. State and National forests judiciously chosen with respect to forest region and forest types will serve as areas to work out and demonstrate good forest practices.

V.

Forests furnish recreation which benefits the health and adds to the happiness of all who avail themselves thereof. The propagation of fish, birds, and game is dependent upon the maintenance of forest cover. Publicly owned forests and parks offer all the people an opportunity to enjoy these privileges in their own right.

VI.

The practice of forestry upon privately owned land should be encouraged by the dissemination of information. Public cooperation in the conservation and renewal of the forests is essential and may be secured by informing the people with facts obtained through research and experience. Since the boys and girls of today are the citizens of tomorrow, it is earnestly desired that forestry be taught in all schools.

VII.

The sympathetic support of all State and local organizations, civic, official, and social, and the people generally, is necessary for the progress of all phases of the forestry movement. Cooperation of all is, therefore, earnestly sought.



Louisiana's forests are noted for their beauty as well as for the value of their products

EXPLANATION OF FOREST POLICY

The first forestry law in Louisiana was passed by the legislature in 1904. Certain matters of policy had been definitely decided even prior to this time and were, therefore, written into the law. Protection of the forests from fire and investigation of the forest problems were among the more important principles established. Lack of appropriation under this law prevented any real accomplishment so far as the state was concerned. Subsequent legislatures passed laws and made investigations. As early as 1910 the legislature decided that forest lands were not fairly taxed under the general property tax system and that while such lands could and should pay their just share of taxes it would require some plan of deferred taxation to assure fairness to the growing timber crop. The increasing area of cut-over, burned-over land began to show the need for some actual effort to reestablish timber growth. Thus it was that even prior to 1918, when the first real appropriation was made available for actual forest work, the forest policy was pretty well established. The past ten years have seen considerable advance in the method of obtaining results under the forestry policy as written into the law. There has, however, been relatively little change in actual policy.

The forest policy for Louisiana has, therefore, become more or less established, at least, with those who were intimately concerned with it. In a fragmentary way it has been published. Protection of the forests from fire is pretty well understood in principle at least. There has been a great deal of discussion of forest taxation and there will be considerably more before a thoroughly satisfactory solution is reached. These are, however, only two of the principles of the policy of the Louisiana Division of Forestry. It is the purpose of this statement to explain in some detail the several more important principles believing that an understanding of the whole will provide a better basis of judgment for the program of the forestry work.

The most casual survey of the economic situation in

Louisiana will convince the average man that the prosperity of Louisiana is ultimately dependent on the maintenance of the forest industries of the state. Nearly one-half of Louisiana's wage earners or a total of 44,548 are employed in the forest industries according to the U. S. census figures for 1919. Wages amounting to \$44,544,000 were paid to them and they produced a product valued at \$130,521,000.00. This was 21.9 per cent of the total value of Louisiana's products of all kinds. These industries paid about 17 per cent of the state's burden of taxes.

It is an established fact that the end of Louisiana's virgin timber is in sight. It is admitted by all who are in position to know the facts that there will be a period of timber shortage in Louisiana. This period may be long or short depending on the steps taken now to assure a succeeding crop of timber. The original area of virgin timber is estimated at approximately 22,065,570 acres. More than 30 years of leadership as a timber producing state, during which period Louisiana has given the United States about one-tenth of the total supply of lumber for all uses, has necessarily reduced the stand. It is surprising that there should be any left. The uncut timber land, according to the report of the Louisiana Tax Commission for 1926, amounts to a total of 2,437,376 acres. Some of this has been cut over but only partially denuded. On other lands the trees have grown to sufficient size to be classed as "uncut". Meanwhile, the larger mills are dropping out one by one.

It is true that Louisiana cut 3,293,091,000 board feet of lumber during 1925. It is also true that Louisiana consumed approximately 700,000 board feet of lumber in addition to other forest products such as pulpwood and fuel wood. Louisiana's demands for lumber will not be less. The promise of development would seem to indicate that it will be even greater. The development of the pulpmills and the creosoting plants in the state assure a profit for timber growing beyond anything realized from the virgin timber. The naval stores industry may be brought back. Louisiana will always

need a large supply of forest products. It will be more economical for Louisiana to grow these forest products than to pay the timber growers of the West and North to grow them and pay transportation charges of \$10.00 to \$20.00 per thousand in addition to the cost of growing the timber.

Finally, there are 16,066,267 acres of forest land, including woodlands in Louisiana. This is more than one-half of the total land area of the state. It is of vital interest that these lands be kept productive in order that they can bear their fair share of taxes. Denuded lands carry only a low assessment and unless they can be made productive, large areas must ultimately revert to the state and become even more of a burden for other lands to carry. Louisiana is not alone with her problem of idle lands. Her sister states have the same problem. There are 81,000,000 acres of such land in the United States.

The answer to the problems of maintaining continuous employment for a large part of Louisiana's wage earners, of making idle lands productive and of growing forest products at reasonable costs lies in a vigorous program of reforestation. After more than a quarter of a century of study on this problem certain definite matters of policy have become fairly well established. The following is an attempt to set forth and explain the policy as it is now understood by those intimately concerned with it for the benefit of all who are or should be interested.

The forest policy for Louisiana includes forest protection, equitable taxation of forest lands, reforestation of idle lands not now needed for other agricultural purposes, proper management of immature stands, investigation of forest problems, public ownership of small areas of forest land for demonstration of approved forest practice and recreation, and a campaign to inform the people of Louisiana of the facts concerning timber growing.

Forest fire as a cause in the disappearance of Louisiana's timber is second only to lumbering. One out of every four acres of forest land in Louisiana burned dur-



(Courtesy of S. W. Green Coastal Plain Animal Husbandry Experiment Station)

THE SOLUTION TO THE PROBLEM OF CUT-OVER LAND IS TO FARM THE BEST AND GROW LIVESTOCK AND
TIMBER ON THE REST

ing the period from July 1, 1926, to December 31, 1927. Again, one acre in every four burned in the year July 1, 1926 to June 30, 1927. The losses of the next preceding year were only moderate. In the fire season of 1924-25 the loss amounted to nearly two out of four acres. Similar losses have occurred since the coming of the white man to Louisiana. The result of burning Louisiana's forest lands at least once in four years has caused a tremendous loss in timber. Several million acres have been kept idle or only partially productive. Bare lands, open stands, scarred and diseased trees tell their tale of repeated fires.

It is estimated by the U. S. Forest Service and the State that the average annual loss from forest fires over a ten year-period has been approximately \$907,545.00. This estimate is probably very conservative since the loss in 1927 from careful estimate amounted to \$2,617,270.00. In 1924 it exceeded \$4,000,000.00. This includes tree growth and forage. The timber, if it were permitted to grow, would bring at least fifty times the value in manufactured products.

Forest fires are caused almost altogether through human agencies. Records over a period of years show that about one per cent of all fires are caused by lightning. Owners of several million acres in Louisiana have signed agreements for the protection of their lands from forest fire. Every possible precaution has been taken by these owners to prevent fires and yet more than 2,000 fires were set in one year within these protected lands. The public is responsible for these fires and should assist the owners not only by preventing such fires but in controlling them once they are started. This is especially true since the public benefits from the forest industries far more than the owner.

The growing timber crop presents a problem in taxation because immature stands of timber are an asset on which the owner may not realize a return for several years. The value of an immature stand represents the accumulated saving of a number of years. It does not make an annual return such as a cotton crop or a corn crop. It serves its owner no useful purpose such

as a barn or house or other improvement. It does not pay a rental. If the timber crop does not suffer a set back from fire or storm or other cause it will make a return to the owner in fifteen, twenty or more years depending on the rate of growth and the market. It seems reasonable, therefore, that the timber grower should make payment for his share of the taxes at the time his crop is ready for harvest.

Local governing bodies must have taxes for their support. In order to provide current revenues, a value for land has been distinguished from the value of the timber and land combined. The land is assessed at its actual cash value and is subject to the same current taxes as other lands. The timber is not taxed until cut.

The long period of time required to grow a crop of timber makes it necessary that the forest land owner understand in advance what he must expect in the way of charges. He would be unwise to put his money into an investment that will make no return over a long period if there is a possibility that excessive taxation would wipe out his investment or force a premature harvest.

The laws of Louisiana provides that a forest land owner may contract his land with the Department of Conservation for timber growing purposes. If approved by the police jury of the parish in which it is located and by the Department of Conservation he is entitled to have his lands assessed at a fixed value, the actual cash value of bare land for a given period of years. He pays no tax on the value of the growing timber until it is cut, at which time he pays a yield tax. This tax is divided between the parish and the state.

The reforestation of forest lands that would not restock otherwise will restore those lands to productivity and enable them to pay their fair share of taxes. Several million acres of forest land in Louisiana have been so reduced in tree growth as a result of the close cutting and frequent burning that they cannot restock naturally. Large areas of longleaf lands do not have sufficient seed trees to accomplish a satisfactory restocking in one hundred or more years. Some of these

areas have lain idle for 10 and even 20 years already. Planting can be done easily and cheaply and will assure productivity to these lands.

When the forest land owners of Louisiana realized that second growth pine grew so rapidly that good sized logs could be cut from trees less than forty years old instead of over one hundred years as in virgin timber some of them began to regrow a crop of timber. A little investigation was required to establish this fact. Another study proved that hogs alone, where they were plentiful, would prevent long leaf pine from reestablishing itself. It required several years of careful experimental work to prove that even the most careful winter burning seriously cut down the rate of growth of longleaf seedlings. Many other experiments may be cited to show the worth of investigation into the problems of timber growing in Louisiana. Interest in these problems is growing, however, until it is not necessary to put forth a lengthy argument for further investigation. This interest demands a solution of the many problems and will find an answer.

It is essential, in the conduct of investigations into the various problems, that certain of them be studied over a period of years. It is also necessary that approved practices be demonstrated so that those who are interested may study them. A series of State and National forests located at convenient points throughout the State and selected to include the several types of timber land would permit proper study and demonstration.

These same forests could serve the public as recreation centers. Individual forests in whole or in part could be set aside as game sanctuaries to breed game for surrounding areas. The public would have ready access to State and National forests.

The public should be informed of the facts concerning the conservation and renewal of the forests. The forestry policy as here stated is the result of years of study and represents conclusions based on facts. These same facts when properly presented to the people of Louisiana in every walk of life will prove convincing. This has been proven in many sections and in a general way throughout the State. The work of information



PULP WOOD CUTTING

The Brown Paper Mill Co., of Monroe, cut the above area leaving the smaller trees to grow for a second cut later on. The area has a chance to reseed satisfactorily

must, however, be continued and extended to reach all people in Louisiana.

The fullest possible cooperation of all interested agencies will be necessary to accomplish real progress in the conservation and renewal of Louisiana's forests. The great task before the adherents of this movement cannot be accomplished by legislation, although some legislation is absolutely essential. It cannot be accomplished simply through appropriations although they are very necessary. Much can be accomplished through cooperation, however, whereas without it there will be very little real progress. All this is thoroughly realized by those interested in the forestry movement. Advice and assistance in all phases of the work is earnestly sought. In turn, information and assistance will be given wherever opportunity offers.

ADMINISTRATION

General Statement.

The Division of Forestry has made progress in its work since the last meeting of the legislature. A satisfactory protection system has been developed for southern pine lands. Over four million acres are now under intensive protection from forest fires. Forest land owners are spending over \$40,000.00 a year on protection. One and one-half millions of dollars have been saved the state in tree growth alone. Thirty-five hundred and eighty acres have been purchased out of savings and added to the State Forest. A forest nursery has been developed that will produce about two million seedlings next fall. Interest in timber growing has increased tremendously through an intensive campaign of information. Investigations have been started in the hardwood belt of the state that will have far reaching benefits for timber growing in that section. An extension forester has been employed cooperating with the Extension Division at a very low cost to the state, for the purpose of assisting farmers with their problem of making the farm woodlot profitable. It is hoped that the work done will merit approval and opportunity for further expansion.

General Forestry Governing Board.

All members of the General Forestry Governing Board have taken an active interest in the work of the Forestry Division during the past biennium. Meetings were held as follows:

January 19, 1926

January 25, 1927

April 13, 1926

July 8, 1927

September 16, 1926

February 28, 1928.

The meetings have been well attended. Detailed reports on the work have been prepared by the staff of the Division and sent to each Board member. These reports have been sent out in advance of the meeting thus allowing the members time to study the progress of the work done in the interval between meetings and to consider recommendations and budgets for the next period. Members who have been unable to come have sent a statement on the work.



INTERNATIONAL TRADE EXHIBITION DISPLAY
The above display was developed by D. B. Demeritt, extension forester,
and put in in cooperation with the Division of Forestry

The Division of Forestry has continued to make sound progress during the past two years. The statements on fire protection, reforestation, and other branches of the work as given later on in this report clearly prove this. That this progress has been possible must be attributed in large measure to the interest taken and the work done by the members of the Forestry Governing Board. All matters of importance have been submitted to them for consideration and approval. Many important projects have originated in their suggestions. Their judgment in all these matters has saved the work from many errors.

The members of the Board include the following: V. K. Irion, Commissioner of Conservation, Ex-officio member and chairman; Col. W. H. Sullivan, Bogalusa; Q. T. Hardtner, Urania; B. F. Smith, Elizabeth; Mrs. A. A. Anding, Opelousas; and Major J. G. Lee, ex-officio member, Baton Rouge. Mrs. Anding was appointed by Governor O. H. Simpson on November 15, 1926, to fill the place created by the legislature of 1926 for a member of the Louisiana State Park Association.

Finances.

The funds of the Division of Forestry are obtained from three sources. First, there is an appropriation of \$80,000 out of the severance tax on timber. This amounts to about one-third of the total severance tax on timber at the present time.

Table 1

Year	Amount of Severance Tax Collected on Timber	Appropriation for timber conservation and timber growing
1921 -----	\$509,052.07†	\$ 60,000.00‡
1922 -----	509,052.07	60,000.00
1923 -----	398,726.69	60,000.00
1924 -----	394,929.32	60,000.00
1925 -----	276,014.46	60,000.00
1926 -----	311,669.73	60,000.00
1927 -----	255,099.66	80,000.00
Total -----	\$ 2,654,544.00	\$440,000.00

†—\$1,018,104.14 was collected on timber severed during the period between April 1, 1920, and December 31, 1922.

‡—Covers fiscal year, July 1, 1920-June 30, 1921.

The appropriation for timber growing was raised in 1926 by the state legislature from \$60,000 a year to \$80,000 a year. The second source of income is the U. S. Forest Service. The allotment for the current fiscal year, 1927-28, amounts to \$34,607.00 of which all but \$2,000.00 is for assistance in fire prevention. The \$2,000.00 is an aid in the development of a forest nursery. The Forest Service allotment which, of course, is made contingent upon a similar allotment from the state has been increased from \$27,320.00 for the fiscal year 1925-26, to the present figure. The third source of funds is the interested land owners. Private land owners contributed \$24,236.43 to the Division of Forestry to aid in fire prevention and \$988.75 to purchase trees for planting forest lands during the fiscal year 1926-27. They will contribute approximately \$33,000.00 for fire prevention and \$1,000.00 for trees and tree seed for forest planting during the current fiscal year ending June 30, 1927. Additional funds spent by these land owners will raise the annual expenditure for fire prevention well over \$40,000 a year. Prior to 1926 no funds were contributed to the Division of Forestry for this work although some funds were spent by private land owners under a cooperative plan of employing fire fighters.

The funds available for work by the Division of Forestry have increased from a total of \$87,320.00 for the fiscal year 1925-26 to approximately \$149,000.00 for the fiscal year 1927-1928 ending June 30th. Additional funds spent by private land owners will materially raise this total. Under the present policy of the Division of Forestry every dollar appropriated by the state brings to its aid nearly another full dollar from the Federal Government and private land owner.

It is estimated that it would cost approximately \$425,000 a year to protect all of Louisiana's lands, pine, hardwood, and cypress (page 65). With the Federal Government and private land owners sharing in this cost on the present basis the cost to the state would be \$212,500.00 a year. The saving in timber growth alone would amount to over two million dollars a year (page 38). Millions of dollars more would be brought into

Louisiana through the manufacture of the forest products grown under protection. It is hoped that this report will establish this simple fact: protection for Louisiana's growing timber does pay and pays well.

Personnel.

The Division of Forestry has been obliged to expand its organization very materially in the past two years. The work of forest fire prevention is largely responsible for this but changes have also been made to meet the demands in other branches of the work. Prior to January 1, 1926, the personnel of the Division of Forestry consisted of about 86 men and women as follows:

PERSONNEL
of the
Division of Forestry
Work assigned December 31, 1925

	Number Employed
Administration, Inspection, Investigation-----	1
Office -----	3
Forest Rangers-----	6
Assistant Forest Rangers-----	6
Cooperative Patrolmen (Fire Wardens)-----	67
State Forest and Nursery-----	2
Miscellaneous -----	1

Total-----	86

This organization had one serious defect, it did not provide adequate inspection to enable the administrator to keep in touch with the work in the field. Close inspection and more thorough study of the organization were needed to make it thoroughly efficient.

The many duties required of the one administrator allowed him too little time for satisfactory investigative work, so essential, in solving the many forest problems of Louisiana.

An attempt has been made to correct the above mentioned defects. It is believed that the organization is more efficient and useful to Louisiana as a result of these changes, and further study will show the way to even better methods.

PERSONNEL
of the
Division of Forestry
December 31, 1927

	Number Employed
Administration, Inspection, Investigation-----	6
Office -----	4
Forest Rangers-----	6
Assistant Forest Rangers-----	16
Fire Lookouts-----	14
Fire Wardens-----	136
State Forest and Nursery-----	2
Miscellaneous -----	1

Total-----	185

The above organization provides for much more efficient handling of the organization than was possible with but one man for administrative and other duties. It also provides for investigation of the forestry problems as required under the present law. The new organization likewise cares for the enlarged program in all branches of the work as set forth in the following pages of this report.

Organization.

Administration, Inspection, Investigation.

The Administrative Staff has been increased from one to six. The additional employees include:

Assistant State Forester, N. D. Canterbury, who has charge of the state forest and nursery in addition to other duties as assistant to the Superintendent of the Division of Forestry; an inspector for the fire protection organization, Sam Morgan, who inspects the forest fire protection work throughout the state; an assistant in public relations, Miss Caroline Dormon, who carries information on the need for forests to the schools and women's clubs; an extension forester, D. B. Demeritt, who aids the farmers in the care and management of the farm woodlot, and a research assistant, G. H. Lentz, who for the present is conducting an investigation of the problems of growing hardwood forests in Louisiana. It should be noted that the Division of Forestry pays

but one-fourth of the extension forester's salary. The balance is paid by the extension service of the Louisiana State University and the extension service of the U. S. Department of Agriculture. It should also be noted that the employment of the research assistant is made in co-operation with the U. S. Forest Service and the Forestry Commission of Mississippi under which each agency is to supply one man. Under this plan we should obtain information on the hardwood problem much more quickly than if the several agencies were working independently.

Office.

Only one member has been added to the office staff. The introduction of labor saving devices and methods together with additional hours of labor have enabled the office to keep up with the rest of the organization.

Forest Ranger.

The present plan for the work of the Division of Forestry divides the state into seven districts for the purpose of handling certain phases of the work such as fire prevention, advice to forest land owners, and information for schools. There are eight of these districts, with forest rangers in charge of six and the remaining two handled by the main office in New Orleans.

Each forest ranger is in charge of about eight parishes or approximately four million acres. They have been selected from the oldest and best trained men in the Division. Each of them has successfully handled the tasks assigned him in the past and merited the opportunity to develop with the work.

The ranger is responsible for the forestry work done in his district under the supervision of the Superintendent of Forestry. He is expected to develop interest and support for the work to the end that Louisiana may have adequate supplies of lumber and other forest products. He is in charge of two or more protection areas as set forth in the statement on forest fire protection in this report. On the average this gives him and

his assistants 670,000 acres to protect from forest fires. He is expected to advise land owners, in the general principles at least, for the planting, care, and management of forest lands. The forest laws of Louisiana are enforced by the forest ranger. He is also expected to be able to inform the people of his district concerning his work and the value of it through the newspapers, schools, various organizations, and by personal contact.

Assistant Forest Ranger.

The assistant forest ranger, as the name implies, is the ranger's aid. Each of them has charge of a definite protection area of from 100,000 acres to 400,000 acres. In addition, he relieves the ranger of a part of his duties in a portion of the ranger's district.

Fire Lookout.

The fire lookout has charge of a lookout tower overlooking protected forest land. It is his duty to discover every fire within the protected area handled from his lookout tower and to see that the proper person is notified concerning it. He may be assigned additional duties such as having charge of telephone line construction, fire break preparation or may aid in directing the fire fighting.

Forest Fire Warden.

The forest fire warden is employed for fire prevention and fire suppression. He is responsible for an area of from 10,000 to 30,000 acres. He is selected because of his interest in the development of Louisiana's forest resources and is expected to be able to convince his neighbors and friends of the value of the work. Emphasis is laid on his ability to prevent fires although he must be a strong man physically to be able to assist in controlling such fires as do start. Great care is used in the selection of the fire warden because he must have the good will of all people around him insofar as that is possible. His success depends on the extent to which he has kept fires from burning his area.

The fire warden like all other employees of the Division of Forestry is employed for service throughout

the year. He is employed, however, at \$2.50 per day, for such days as he works. On the average he works 100 days and receives \$250.00.

Emergency Fire Fighters.

Where conditions are unusually hazardous, emergency fire wardens are enlisted to aid the warden. These men are approved by the ranger before the beginning of the fire season and are paid at the rate of 25c per hour for the time spent actually fighting fires. No pay is given for fire fighting except as thus arranged for in advance.

Supervision.

An annual meeting has been held for the members of the Division of Forestry including the rangers, assistant rangers and the technical staff. One week during the summer months has been devoted to a conference on the work. The work of the previous year is discussed and analyzed. Men who have had a great deal of work along some special line have an opportunity to discuss it for the benefit of all. Instruction is given in policy and methods. Authorities on various subjects outside of the Division have been invited to address the conference. Some practice work is done to insure that the instruction is understood. With this as a basis, plans are laid for the coming year. The conference thus gives everyone an opportunity to present his problems and to know what is expected of him for the coming year.

The conference was carried one step further at the meeting held in July, 1927, through the development of working plans for each man. Every man was required to write a plan of work for his territory for the coming year. In it he was expected to set forth the situation with regard to each phase of the work at the present time. Then he stated the attitude of the people in his district toward fire protection and gave information on the fire hazard and progress of the work. The same for reforestation and so on. Next he set down in detail the things planned for his district for the coming



(Courtesy Southern Forest Experiment Station)

PROTECTED FROM FIRE
 Longleaf Pine Seedlings—14 Years Old—1927
 Roberts Plot, Umania.



(Courtesy Southern Forest Experiment Station)

BURNED ANNUALLY DURING THE WINTER
 Longleaf Pine Seedlings—14 Years Old—1927
 Roberts Plot, Umania.

year. The plan of work was made up in such a way that he could write down the things he did from week to week. At the end of the year the complete report would show how well he had done the things he had set out to do. Year after year these reports will be used. They will contain a vast fund of information on the work of the Division of Forestry.

FOREST FIRE PROTECTION

Importance.

The forest fire protection work of the Division of Forestry saved the State of Louisiana approximately one and a half million dollars in tree growth on areas protected for the eighteen months from July 1, 1926, to December 31, 1927.

Table No. 2

Area protected by Division of Forestry.	Period under Protection.	Per cent Burned in Protected Area.	Percent Burned in Unprotected Area. (Approx. 7,500,000 acres considered).	Percent of Protected Area Saved (Subtract figure Col. 5 from figure in Col. 4)	Area Saved in Protected Areas.	Value of Timber Growth Saved at \$1.00 per Acre.
(Acres) (1)	(2)	(3)	(4)	(5)	(Acres) (6)	(Dollars) (7)
3,100,096	12 months 7/1/26 to 6/30/27	3.1	24.0	20.9	647,919	\$647,919.00
4,032,680	6 months 7/1/27 to 12/31/27	1.8	24.3	22.5	907,355	907,355.00
TOTAL.....						\$ 1,555,274.00

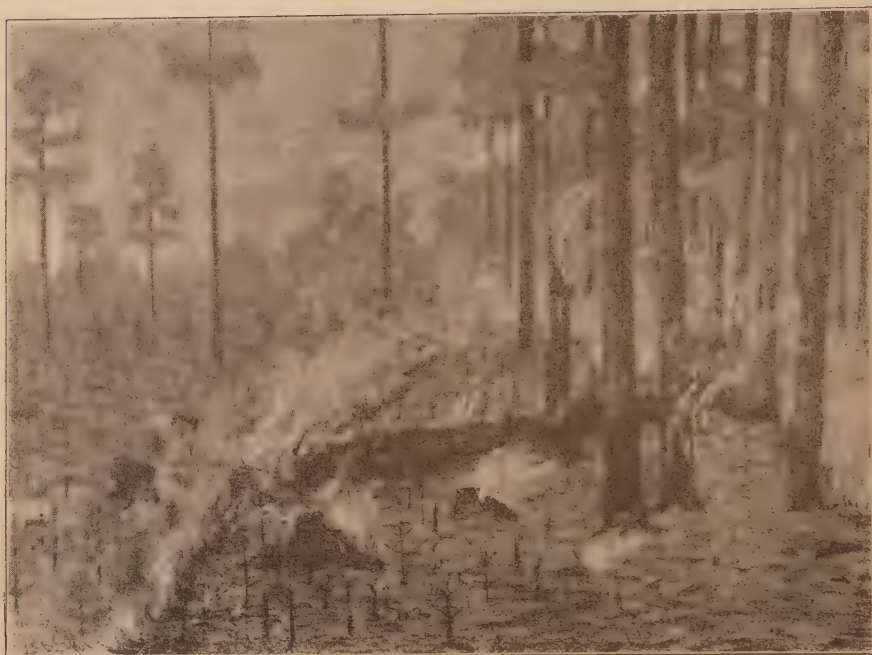
This saving is based on a comparison of the area burned in the land under protection with the area

burned in similar unprotected lands. A brief glance at the above table will show that the Division of Forestry prevented 647,919 acres from burning during the first year of work with the protection system now in operation. The area saved during the next six months was 907,355 acres. Conservative estimates place the loss from forest fires at \$1.00 per acre. The saving through the protection work of the Division of Forestry amounted, therefore, to \$1,555,274.00 in eighteen months.

There are over sixteen million acres of forest land in Louisiana of which all but the very lowest lands in the cypress and tupelo swamps are subject to forest fires. The cypress and bottomland hardwood acres will not burn over in ordinary seasons, but they suffer severe losses during periods of protracted dry weather. Pine lands on the contrary burn over frequently. Records show that fires may burn in Louisiana's pine lands at any season of the year and at any time of the day or night. A few hours of sunshine following a moderate rain in our longleaf areas will dry the grass and needles so that they readily ignite and burn freely.

The damage done by these fires is evident to all who have studied the problem. Seedlings less than a year old of all species of trees in Louisiana are easily killed. The pines soon develop a thick bark that protects them in a measure from moderate fires. The longleaf is particularly resistant, for, in addition to a thick bark, its long needles form a protecting barrier of foliage for the bud and stems. Longleaf and shortleaf pines often send up sprouts when the main stems of a young tree are killed. However, bark, foliage, and sprouting capacity may all fail to save the tree in a very hot fire. Young trees that are not killed by fire are often scarred and usually stunted in their growth owing to the loss of needles, injury to living tissues and lowered fertility of the soil.

Immature stands and even virgin forests occasionally suffer heavy losses from fire. The amount of inflammable material such as grass, needles, etc., on the ground, the dryness of the material, and the dryness of atmosphere and the wind are important factors in de-



Typical Louisiana Forest Fire

termining the damage that fire may cause. When these conditions are right stands of all ages and pine trees from the smallest to the largest may be killed.

It is estimated by the U. S. Forest Service that the average annual fire loss for Louisiana for the past ten years has been approximately \$907,545.00. This figure, based upon estimates from the state, is probably very conservative. The loss from fire in Louisiana in 1924 was reported as \$4,524,090.00. Careful estimates for 1927 show 3,414,422 acres burned. The loss from the fires of 1927 in timber growth and forage is estimated at \$2,614,270.00.

Fires, however, cause far more damage than can be represented in the present or potential stumpage value of forest products. The loss in soil values through erosion and lowered fertility are fully as real though less easy to translate into money value. The effect on climate, on stream flow, on game, and on the general health and comfort of the people can scarcely be ap-



COMPARATIVE HEIGHT GROWTH OF YOUNG LONGLEAF
ON BURNED AND UNBURNED LAND
Measurements taken at Urania and compiled by Southern Forest
Experiment Station

praised. It should be noted that the forest industries of Louisiana are dependent on the forests of Louisiana for their raw material. One-half of Louisiana's wage earners in industry obtain their livelihood from the forest industries. When a cord of pulpwood is destroyed, the loss is not simply fifty cents or a dollar's worth of wood as stumpage; that cord of pulpwood may give the farmer a chance to earn some extra money during a slack period. The pulp mill employs labor, and utilizes Louisiana chemicals and gas in converting the raw wood into pulp or paper. The finished product is worth perhaps fifty times as much as the stumpage value of the original cord of pulpwood. The mill and its workers make the community prosperous. The loss or injury to forest growth is, therefore, a loss to the community and state.

Protection of the forest lands from fire will itself assure a very good crop of timber over the larger part of Louisiana's forest lands. There are, to be sure, large areas where, through reckless cutting followed by devastating fires, the lands are so bare of tree growth as to require planting. Ten per cent of the forest lands may be in this condition. The remaining area is either



(Courtesy Southern Forest Experiment Station)

FIRE DAMAGE IN OLD GROWTH LONGLEAF PINE
One out of every four trees in old growth stands of longleaf
are scarred by fire.

already stocked with seedlings or trees or will restock naturally if given fire protection.

The Division of Forestry has, therefore, realized that its most important task at this time is to provide protection to Louisiana's forest lands. The protracted dry weather of 1924 and 1925 created conditions that resulted in the burning of most of Louisiana's forest lands. The hardwood lands of the Mississippi bottoms suffered heavy losses. Even the cypress swamps in many sections caught fire and burned for months. The pine lands, with the exception of such carefully protected areas as the holdings of the Great Southern Lumber Company, at Bogalusa, the Urania Lumber Company, at Urania, and one or two others, were burned almost completely. Some areas burned twice and even three times. Under conditions such as these it was useless to expect worthwhile results from an effort to protect the entire state with the small state appropriation (\$60,000 a year at that time) available.

Accordingly, the Division of Forestry at the beginning of 1926, found itself faced with the problem of adapting a fire protection system to conditions existing in Louisiana that would secure worthwhile results. The

task of informing the people of Louisiana of the value of protecting the forest lands had progressed to the point where they appreciated the need for this work. Few believed, however, that southern pine lands could be protected at a reasonable cost. The forest lands of northern states had been given some measure of protection from fire for many years. Small areas in the South had been protected with varying results for several years. These facts indicated that the job could be done, but prior to 1926 no Southern State had definitely undertaken the protection of any considerable portion of its forest lands under a system that could assure that no large percentage of the protected area would burn. Believing protection could be assured, the members of the Forestry Division of the Department of Conservation set about developing a protection system. Careful study was made of the work of other states and of the U. S. Forest Service. A system was then developed for Louisiana carrying into effect the ideas that had proven most successful elsewhere.

Fortunately, the fire season of the first six months of 1926 was not hazardous. The severe losses of the previous year had convinced many of the need for care in the use of fire in the woods. The disastrous fires of the preceding season had left but little to burn. Finally, the rainfall during this period of 1926 was moderately heavy. These factors combined to give the Forestry Division a brief resting period in which to develop a more satisfactory protection system. By July 1, 1926, the Division had its plans completed and was ready to offer protection to forest lands wherever owners could be found who would cooperate.

Policy.

Protection of forest lands from fire depends upon the cooperation of the land owners and the public. The land owner must want his land protected since there is no law to prevent him from burning his own land if he so chooses. The public must aid him in protection since, if he tries to protect his own land, it can be

burned only by the public (with the exception of the very rare fires caused by lightning). Ninety-nine per cent of all forest fires in Louisiana are caused by human agencies.

The responsibility for protection of forest lands does not differ materially from the responsibility for protection of the homes and other property in the city. No progressive city would consider anything less than a thoroughly competent and efficient fire fighting force to protect its property. The cost of such system is paid from the taxes collected by the local governing body.

The forest protection policy of the Division of Forestry provides for a campaign to inform people throughout Louisiana of the value of preventing forest fires. This campaign is state-wide in scope. It does not contemplate the control of all forest fires in the state since that would be impossible with the funds now available. Instead, the Division of Forestry is cooperating in fire control with landowners who have demonstrated their intention to prevent forest fires. The policy was adopted by the General Forestry Governing Board of the Division of Forestry in January, 1926.

Campaign of Information.

The state-wide campaign for the prevention of forest fires is carried on with the general campaign of information on other branches of the forestry work, such as, proper cutting, thinning, reforestation of idle lands, and forest taxation. That work is more fully described under general forestry (page 78). Certain activities that apply to the fire protection work only are included below.

The importance of the prevention and suppression of fire is stressed in the addresses, lectures, and exhibits given by the Division of Forestry. Bulletins and other publications give fire prevention due emphasis. Fire signs have been posted throughout most of the wooded area of the state. Samples of these are shown to indicate the methods used in presenting the forestry problem. One of these signs took second prize over two



BURNED ANNUALLY (Photo by U. S. Forest Service)
The result of severe cutting and repeated burning



(Photo by Great Southern Lumber Co.)
PROTECTED LONGLEAF LAND
Protection from fire will bring back most of Louisiana's cut-over lands if
It is started while there are seed trees or seedlings left.

hundred other signs at a recent poster contest held at St. Louis. Over 15,000 signs have been printed and distributed during the past two years. Copies of all of these signs are available for distribution.

A sketch of a southern forest fire was drawn for use in a scene-in-action display. This display (see page 40) represents a southern forest with old growth timber and young seedlings apparently burning over. The display has been adopted by practically all the Southern States and by the Forest Service for use in the South. Miss Caroline Dorman, of Chestnut, Assistant in Public Relations with the Division of Forestry, drew the sketch.

Law Enforcement.

Employees of the Division of Forestry have tried at all times to enforce the laws relating to fire protection. Emphasis has been placed on encouraging compliance with the law rather than on rigid enforcement. The law (Sec. 7, Act 90 of 1922 as amended) requiring the use of spark arresters on wood burning locomotives and engines has been thoroughly enforced. It required several years to obtain the cooperation of some individuals in carrying out this law, but for the past two years the regular inspections reveal that practically all operators have the proper equipment and have it in working order. It is seldom necessary to force obedience to the law through the courts. The attention of the railroads has been called to the law (Sec. 6, Act 90 of 1922 as amended) requiring the clearing of right-of-ways during the hazardous winter season. In the main, this law has been carried out. The number of fires caused by railroad employees and equipment has been greatly reduced. This is particularly true in the areas under systematic protection from fire.

There have not been many prosecutions for violation of the law (Sec. 4, Act 90 of 1922 as amended) with regard to setting fire to the woods. This is due in part to the difficulty of catching such violators and in part to the policy of the Division of Forestry which emphasizes the program of education rather than strict law enforcement. Nevertheless, thirty-five persons have



SAMPLE FIRE SIGNS
Over 15,000 fire signs have been distributed through the state in the past two years

been arrested in the past year and a half. Thirty convictions were obtained. These convictions have aided in uniting the public in favor of fire prevention.

Fire Control.

The cost of fire control under the Louisiana system is shared by the owner, the State, and the Federal Government. The owner pays one-half the total cost. The State and Federal Governments each pay one-fourth.

The owner's share amounts to two cents per acre per year for all lands listed with the Division of Forestry for protection. In addition, the land owners erect lookout towers where needed to aid in fire detection. In an emergency the land owners send in additional fire fighters and fire fighting equipment. The State and Federal Governments each contribute one cent per acre. Neither the owner nor the state is bound by the agreement to spend in excess of the amount stated in advance, namely: two cents for the owner and two cents for the State and Federal Governments. Any saving is held as a reserve against an unusually severe fire season. The state supervises the work. Plans for protection of each area are worked out in conference between the land owners and officials of the Division of Forestry.

More than one hundred and fifty land owners have signed agreements under this plan for cooperative fire protection. The lands listed for protection amount to approximately 1,650,000 acres. Protection of these lands owned by cooperators requires the protection of adjacent land to the amount of 1,650,000 acres. Two large owners who are protecting their own lands with about the same amount of aid from the Division of Forestry care for 732,680 acres, making the total of 4,032,680 acres now being protected in Louisiana. The contributing land owners are paying about \$33,000 a year to the Division of Forestry and in addition are spending several thousand dollars in erecting fire towers and in emergency fire fighting. The annual expenditures by private land owners exceed \$40,000.00 a year. All expenditures are made with the advice and approval of the General Forestry Governing Board.

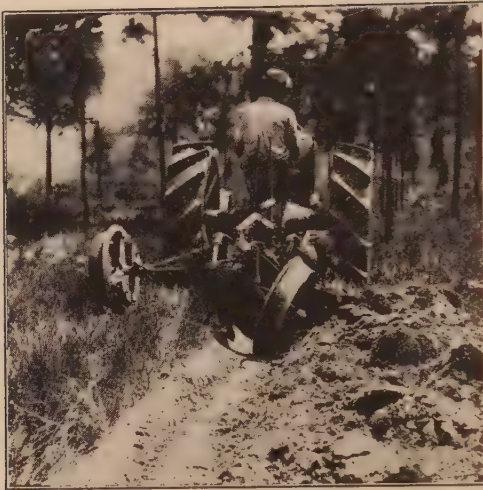


Type of Lookout Tower used in Louisiana Forest
Fire Prevention System

Forest Protection System for Protection Areas

Louisiana's forest protection system as worked out for the protection areas at the present time includes: lookout towers for quick detection; telephone service for instant communication; automobiles for rapid transportation; fire breaks to aid in suppression; local citizens for fire wardens; and close supervision by a trained corps of forest rangers.

Fifteen lookout towers are now in operation. (See map, page 52.) Plans are going forward for the erection of several more. Each lookout tower commands a view over approximately 200,000 acres. The fire lookout who is on watch at all hazardous times of the day and



Making a Fire Break

night, can readily locate fires at a distance of eight to ten miles and frequently discovers fires at a greater distance. Under average conditions fires can be discovered by the fire lookout within five minutes from the time they start.

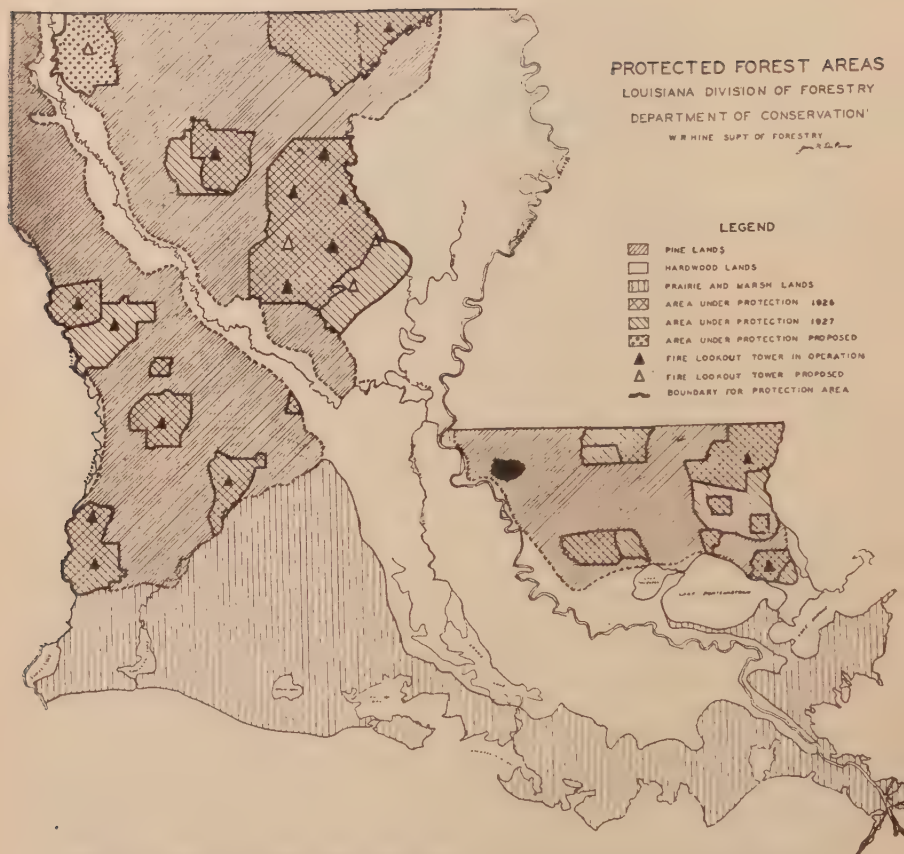
The fire wardens, who are usually farmers living on the land under protection, are assigned a definite area of from 10,000 to 30,000 acres, depending on the hazard, for which they are responsible. They have communication over a state-owned telephone system with the lookout. One thousand miles of such state-owned telephone line are now in operation. When the lookout discovers a fire he telephones the fire warden in charge of the area that is burning. Automobiles enable the fire wardens to travel quickly, and they are usually fighting a fire within a half hour from the time it is started. If the fire is a large one, the fire wardens from adjoining areas are sent in to aid. In an emergency the ranger in charge calls in whatever additional help may be needed from the employees of the cooperating land owners or emergency fire fighters for whose services previous arrangements have been made. No reimbursement is made to fire fighters except those retained at the beginning of the fire season.

Table No. 3
CONSTRUCTION WORK ON TELEPHONE LINES
AND FIRE BREAKS
Period July 1, 1926—December 31, 1927

Protection Area	Prior to July 1, 1927	July 1 to Dec. 31, 1927	TOTAL	Old Lines Renewed	New Lines Since July 1, 1927	TOTAL
(Miles)						
Morehouse Parish.....	22	--	22	--	2	2
Union Parish.....	--	--	--	--	--	--
Grant, Winn, Jackson, Ouachita, Caldwell, LaSalle, Catahoula Parishes.....	266	108	374	254	146	400
Bienville and Jackson Parishes	43	48	91	--	36	36
Sabine Parish.....	40	50	90	200	800	1000
Vernon Parish.....	38	11	49	400	240	640
Calcasieu and Beauregard Parishes	100	15	115	400	200	600
Allen Parish.....	67	5	72	80	340	420
St. Helena and Tangipahoa Parishes	27	38	65	20	25	45
St. Tammany Parish.....	30	10	40	50	25	75
Livingston Parish.....	20	9	29	--	30	30
Washington and St. Tammany Parishes	54	21	75	323	75	398
Rapides Parish (State Forest).....	--	--	--	12	14	26
Total	707	315	1022	1739	1953	3692*

*—Additional lines constructed by the Great Southern Lumber Company will make total in excess of 5,000 miles.

Fire breaks, made by plowing two furrows fifty feet apart and burning the intervening strip of grass, serve to aid in the control of fire. Such fire breaks are systematically laid out. In laying plans for protection in a given area a map is first made of the existing roads, railroads, streams and marshes that could serve as fire breaks. Additional fire breaks are then constructed so as to split up the remaining large areas of forest or grass land. In this way, each block of 600 or 800 acres of land has a protecting strip or natural fire barrier around it. Strips are also burned along the main high-



MAP SHOWING AREA PROTECTED BY THE DIVISION OF FORESTRY
 Four million acres under protection throughout Louisiana

ways for added protection from careless travelers. Over five thousand miles of such fire breaks were prepared as an aid in suppressing the winter fires of 1927-28.

The forest rangers who have immediate charge of the fire organization are men of considerable experience. Several of them have been engaged in forestry work for ten years or more. All have been thoroughly trained in their duties. Frequent inspections assure that their work is uniformly satisfactory.

A glance at the above map will show how the protection system of the Division of Forestry has been put in operation in every section of the state.

The appropriation available for protection work



Southwest Louisiana Protection Area 256,000 Acres.

The forest fire protection system here shown is in effect on the several protection areas under the supervision of the Louisiana Division of Forestry. (See map, page 52.) Changes are made to suit local conditions in each protection area.

does not warrant trying to protect the entire state. Failure in the past has proven that. Accordingly, the efforts of interested land owners in various sections have been combined and their holdings included in what are termed protection areas. The sum of the areas of the protection units amounts to 4,032,000 acres. The Division of Forestry is straining every effort to bring these protection areas through with a minimum of area burned. Success in these areas will show the way to successful protection for the state and the South.

Table No. 4

AREA UNDER PROTECTION
(Division of Forestry and Land Owners Cooperating)

Protection Areas	Protected Area July 1, 1927 (Acres)	Increase (Acres)	Protected area Jan. 1, 1928 (Acres)
Morehouse Parish-----	149,760	-----	149,760
Union Parish-----	300,000	-----	300,000
Grant, Winn, Jackson, Ouachita, Caldwell, LaSalle, Catahoula Parishes -----	1,064,000	250,000	1,314,000
Bienville and Jackson Parishes--	216,910	100,000	316,910
Sabine Parish-----	146,136	223,864	370,000
Vernon Parish Lbr. Co.-----	18,000	-----	18,000
Vernon Parish-----	175,466	-----	175,466
Calcasieu and Beauregard Par- ishes -----	256,000	-----	256,000
Allen Parish-----	165,217	-----	165,217
St. Helena and Tangipahoa Par- ishes -----	126,720	46,000	172,720
St. Tammany Parish-----	57,600	20,000	77,600
Livingston Parish-----	106,787	47,000	153,787
Washington and St. Tammany Parishes -----	310,000	245,720	555,720
Bossier Parish-----	-----	-----	-----
Rapides Parish (State Forest)---	7,500	-----	7,500
Total -----	3,100,096	932,584	4,032,680

Results.

The results of the protection work have thus far been highly satisfactory. Three million acres of forest land were protected from July 1, 1926, to June 30, 1927, one full fire year with a burned area of only three and one-tenth acres in one hundred. Surrounding lands by careful estimates showed a burned area of eighteen and three-tenths acres in every hundred or practically six times as much.

Table No. 5

SUMMMARY FIRE RECORD FOR AREA PROTECTED
Period July 1, 1926, to June 31, 1927

Protection Area	Total Area	Number of Fires	Area Burned	Per Cent Burned
	(Acres)		(Acres)	
Morehouse Parish-----	149,760	10	609	0.4
Union Parish-----	300,000	10	157	0.05
Grant, LaSalle, Winn, Caldwell, Catahoula, Jackson and Oua- chita Parishes-----	1,064,000	274	20,198	1.9
Bienville and Jackson Parishes	216,910	93	2,520	1.2
Sabine Parish-----	146,136	5	255	0.2
Vernon Parish-----	193,466	152	4,759	2.5
Calcasieu and Beauregard Par- ishes -----	256,000	205	17,847	7.0
Allen Parish-----	165,217	78	20,270	12.3
St. Helena and Tangipahoa----	126,720	42	7,931	6.3
St. Tammany-----	107,600	29	5,121	4.8
Livingston Parish-----	106,787	30	539	0.5
Washington Parish-----	260,000	221	16,651	6.4
Rapides Parish (State Forest)	7,500	--	--	0.0
Total -----	3,100,096	1,149	96,857	3.1

Careful estimates on unprotected areas show that 18.3% or 18-3/10 acres in one hundred acres burned.

Every land owner who cooperated the first year was satisfied and continued the cooperation during the present year. Moreover, these land owners and others placed nearly a million more acres under protection for the present fire year, making the total of 4,032,000 now under protection.

Even more satisfactory results were obtained during the dry fall of 1927. Ten hundred and twenty-seven fires were extinguished in the protection areas in the period from July 1, 1927, to December 31, 1927. In the 4,032,000 acres under protection only one and eight-tenths (1-8/10) per cent burned.



MAKING THE FIRE SAFE

The Division of Forestry is using the most up-to-date equipment in developing the technique of fire fighting

A careful estimate of the area burned on 7,050,233 acres of unprotected land of similar forest cover throughout the state showed an average of 24.3% or $24\frac{3}{10}$ acres in one hundred acres burned. The loss in unprotected land for the last six months of 1927 amounts, therefore, to 1,711,740 acres. The difference between the loss per hundred acres in our protected area as against unprotected area amounts to 22.5 acres in every hundred. This means that the Division of Forestry saved 22.5 acres in every hundred that it was trying to protect from burning.

Weather Record.

It should be noted that the six months from July 1, 1927, to January 31, 1927, was a period of unusually dry weather. Fully as much land was burned over during this six months in unprotected land throughout the state as burned over during the entire preceding year, July 1, 1926, to June 30, 1927, in the same areas. Re-

Table No. 6
SUMMARY FIRE RECORD FOR PROTECTED AREAS
Period, July 1, 1927, to December 31, 1927

Protection Area	Area Protected (Acres)	Number of Fires	Area Burned (Acres)	Per Cent Burned	Timber Damage \$	Other Damage \$	Total Damage \$
Morehouse Parish-----	149,760	6	224	.1	5	22	27
Union Parish-----	300,000	16	311	.1	299	10	309
Grant, LaSalle, Winn, Caldwell, Catahoula, Jackson and Ouachita Parishes-----	1,314,000	230	9,944	.8	5,635	812	6,447
Bienville and Jackson Parishes-----	316,910	127	1,359	.4	546	51	597
Sabine Parish-----	370,000	38	327	.1	235	53	288
Vernon Parish Lbr. Co.-----	18,000	5	229	1.3	---	22	22
Vernon Parish-----	175,466	102	2,144	1.2	810	218	1,028
Calcasieu and Beauregard Parishes-----	256,000	268	34,051	13.3	28,959	8,181	37,140
Allen Parish-----	165,217	51	7,790	4.7	1,542	714	2,256
Livingston Parish-----	153,787	6	123	.0	93	3	96
St. Helena and Tangipahoa Parishes-----	172,720	26	2,225	1.3	2,188	119	2,307
Washington and St. Tammany Parishes-----	555,720	129	12,904	2.3	7,248	994	8,242
St. Tammany Parish-----	77,600	23	2,351	3.0	1,592	531	2,123
Rapides Parish (State Forest)-----	7,500	---	---	.0	---	---	---
Total -----	4,032,680	1,027	73,982	1.8	\$ 49,152	\$ 11,730	\$ 60,882

ports from eleven stations of the Weather Bureau located in or near protection areas show that no rain occurred on 142 days out of the 184 days from July 1 to January 31, 1927. Days receiving as much as 0.01 of an inch of rainfall were considered to have received rain. The pine forests of Louisiana may readily burn any day that only 0.01 inch of rainfall was received. The actual deficit in rainfall amounts to 3.09 inches or 12% of the average total for the period.

Table No. 7

WEATHER REPORTS
FROM STATIONS IN OR NEAR PROTECTED AREAS
 Period July 1, 1927, to January 1, 1928

Weather Station Reporting	In or near Pro- tection Area	Precipitation in inches		Number days with precipitation of 0.01 inches (out of 184 days)
		Total	Departure from Normal	
Calhoun -----	Union -----	17.24	-5.02	31
Dodson -----	} North Louisiana -----	20.05	-2.78	32
Monroe -----		23.52	+0.85	49
Ruston -----	Bienville -----	16.42	-6.01	36
Robeline -----	Sabine -----	20.42	-1.97	42
New Llano -----	Vernon -----	24.21	---	26
DeRidder -----	Calcasieu and Beauregard -----	28.10	---	50
Elizabeth -----	Allen -----	26.91	---	37
Covington -----	} Washington and St. Tammany -----	22.85	-7.41	55
Franklinton -----		28.31	-2.02	41
Pearl River -----	St. Tammany -----	23.14	-9.66	60
Average for 11 stations -----		22.83	-3.09	42

Causes of Fire.

Ninety nine per cent of Louisiana's forest fires are caused by human agencies. Only eleven out of 1027 fires that burned in the protection areas during the last

six months of 1927 were caused by lightning and were, therefore, preventable. At least 33% of these fires are intentionally set. The remaining 66% must at best be considered as the result of carelessness. It is, indeed, time that Louisiana's citizens realized that the maintenance of her lumber industry and the development of new industries depends solely on their attitude toward the prevention of forest fires.

Table No. 8
SUMMARY OF FIRES BY CAUSES
Period July 1, 1927, to January 1, 1928

Cause of Fire	No. of Fires	Area Burned (Acres)	Per Cent Burned
Lightning -----	11	9,133	1.1
Railroads -----	72	1,716	7.0
Logging -----	85	2,982	8.3
Brush Burning -----	58	2,478	5.6
Campers -----	75	2,741	7.3
Smokers -----	116	1,603	11.3
Incendiary -----	342	33,189	33.3
Miscellaneous -----	82	4,562	8.0
Unknown -----	186	15,578	18.1
Total -----	1,027	73,982	100.0

Careful record has been made of each fire that has occurred in the protection area of the state. Study of these records is being made to improve the technique of fire prevention and control. The records for the past six months show that 975 fires out of 1027 or 94% of all fires that were set in the protected areas were discovered by the employees of the Division of Forestry. Eight hundred seventy-seven or 85% were extinguished by the protection organization. Volunteer fire fighters and rain accounted for most of the rest. A few did not spread sufficiently to attract attention before they burned out at some road or creek.

It has been found that fire towers are almost in-

dispensable in fire control. They enable the lookouts to detect fires within a few minutes after they start. Quick detection is an important step in fire control. Fires in longleaf pine must be attacked when they are small or control is difficult and expensive, and the acreage lost may become very large. This is shown by a comparison of the size of fires which were allowed to burn for 30 minutes before fighting began with fires that burned 60 minutes before fighting began, and again, with fires that burned for longer periods as for example 120 hours or 2 hours. This comparison shows that fires that are reached within 30 minutes, burn on the average only one-fourth as much acreage as fires that are not reached within an hour and only about one-tenth as much as fires that are not reached within 2 hours. Table No. 9 below classifies the 1027 fires in the protection areas during the last six months of 1927. The value of speed in control is clearly shown by the fact that fires that were reached within 30 minutes burned only 98 acres on the average, whereas, fires that were not reached within two hours burned on the average 1098 acres.

Table No. 9

RELATION OF ELAPSED TIME TO LOSS IN ACREAGE

Elapsed time between start of fire and time fire fighting began	No. of Fires	Total Area Burned (Acres)	Average Size of Fire (Acres)
Less than 30 minutes.....	250	24,400	98
31 minutes to 1 hour.....	337	13,385	397
1 hour to 2 hours.....	285	19,185	673
Over 2 hours.....	135	17,012	1,098
Total	1,027	73,982	720

Study of the efforts of the employees of the Division of Forestry will reveal that fire protection has been a difficult task. The map below shows a protection unit in Vernon Parish. The total area of the protection unit

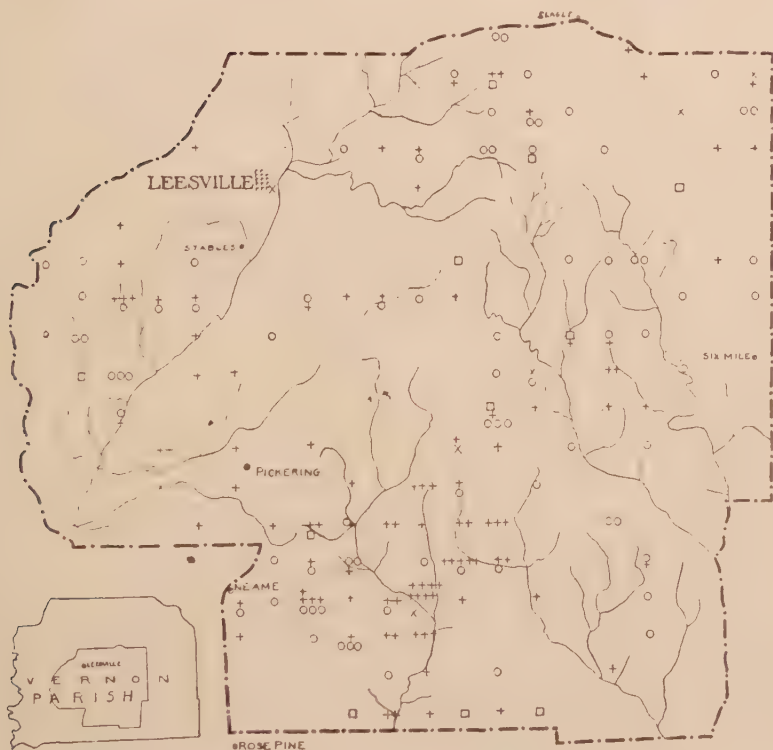
OCURRENCE OF FIRES 1927 VERNON PARISH PROTECTION AREA

AREA UNDER PROTECTION 175,466 ACRES
Area Burned 10,266 Acres Per Cent Burned 6% Number of Fires 200

X FIRES $\frac{1}{4}$ ACRE OR LESS — O FIRES 11 ACRES TO 100 ACRES.
+ FIRES $\frac{1}{2}$ ACRE TO 10 ACRES — □ FIRES 101 ACRES TO 500 ACRES

W.R. HINE SUPT. OF FORESTRY

James M. Ben Fournier



VICINITY MAP

The number and location of fires in the protection area shown above indicate that practically all of the area would have burned if there had not been a fire fighting organization caring for it. The Louisiana forest fire protection system held the losses from fire in this protection area to but 6 acres in a hundred. The average fire covered only 51-1/3 acres.

is 175,466 acres. It is a country of open longleaf pine land covered with heavy grass. Two hundred fires started in the forest lands of this protection area during the calendar year 1927. These fires were scattered throughout the entire area so that without an efficient fire fighting organization practically all would have burned. Ninety per cent of similar lands outside of the

protection area did burn. Only six acres in a hundred burned in this protection area in 1927.

Careful study of the map will show that fires started throughout the area and were not confined to the highways or to the vicinity of towns or logging operations. Somewhat the same situation holds throughout the rest of the state's protection areas. This scattered distribution of the fires makes it very difficult to plan the fire fighting in advance. Satisfactory protection can be assured only by a thoroughly efficient organization equipped to act quickly.

Table No. 10
TOTAL COST OF PROTECTION FOR TWELVE MONTHS
(Compare with Table 11)
Period July 1, 1926, to June 30, 1927

Protection Area (Parishes)	acres	Cost of Protection—7/1/26 to 6/30/27	Cost per-acre for 1 year
			Cts.
Morehouse	149,760	\$ 1,807.96	1.2
Grant, LaSalle, Winn, Caldwell, Cata- houla, Jackson and Ouachita.....	1,064,000	14,500.16	1.4
Bienville and Jackson.....	216,910	1,886.85	.8
Sabine	146,136	2,045.67	1.4
Total North Louisiana Lands.....	1,576,806	\$20,240.64	1.3
Vernon Parish Lbr. Co.....	18,000	255.01	1.4
Vernon	175,466	3,929.67	2.7
Calcasieu and Beauregard.....	256,000	5,832.26	2.3
Allen	165,217	5,211.02	3.2
Total Longleaf Lands of South Louisiana	614,683	15,227.96	2.5
Total all areas.....	2,191,489	\$35,468.61	1.6

Cost.

The average cost of fire protection under the system now in effect in Louisiana is 2.4 cents per acre per year. This figure is based on the cost of protecting 2,191,489 acres for eighteen months. All of this area is under

FIRE SWATTER USED IN LOUISIANA

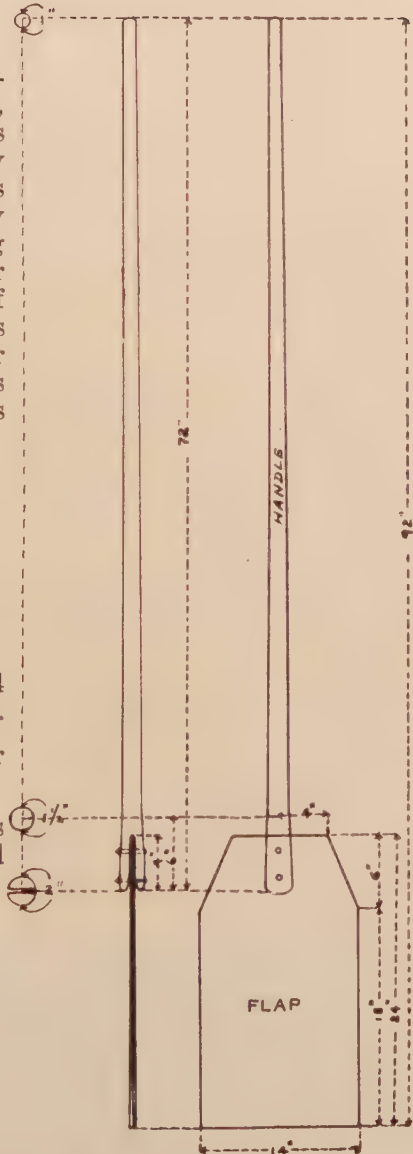
The Fire Swatter, originated by H. J. Eberly, Texas Forest Service, is inexpensive and easily constructed. The flap is made of three- or five-ply used belting. Any strong wood may be used for the handle. The end of the handle that receives the flap may be split or sawed out. The flap is held in place with bolts and nuts.

List of Parts

24 inches of belting, 14 inches wide, 3- or 5-ply.

Wooden handle, ash or hickory, 6 feet long.

2 1/4-inch bolts, 2 inches long, with nuts and washers.



Scale:—1 inch equals 1 foot

the protection system described in preceding pages. All lands within the boundaries of the protection areas are considered in making the estimate, not simply the forest lands. All important types of pine lands and some hardwood lands are included.

Table No. 11

TOTAL COST OF PROTECTION FOR SIX MONTHS
Period July 1, 1927 to December 31, 1927

Protection Area (Parishes)	Acres	Cost of Protection—7/1/27 to 12/31/27	Cost per acre for 6 mos. (Cents)	Cost per acre for 18 mos. (See Table 10)	Average cost per acre for 1 year (See Table 10)
Morehouse -----	149,760	2,561.99	1.7	2.9	1.9
Grant, LaSalle, Winn, Caldwell, Catahoula,					
Jackson and Ouachita----	1,314,000	16,065.01	1.2	2.6	1.7
Bienville and Jackson----	316,910	5,080.19	1.6	2.4	1.6
Sabine -----	370,000	6,071.78	1.9	3.3	2.2
Total North La. Lands----	2,150,670	29,778.97	1.4	2.7	1.8
Vernon Lbr. Co.-----	18,000	273.15	1.5	2.9	1.9
Vernon -----	175,466	4,825.05	2.8	5.5	3.7
Calcasieu and Beauregard	256,000	11,052.28	4.3	6.6	4.4
Allen -----	165,217	4,535.59	2.7	5.9	3.9
Total Longleaf Lands of South Louisiana-----	614,683	20,686.07	3.3	5.8	3.9
Total All Areas-----	2,765,353	50,465.04	1.8	3.4	2.3

It is not considered at this time that these figures are sufficient basis for accurate determination of the cost of protection over a period of years. This is especially true with regard to hardwoods because no work has been done on any large area over any considerable period of time. They should serve as a rough guide. As such they indicate that Louisiana's forest lands may be protected from damage by fire at a ridiculously small cost. A tentative set of figures is offered to show what

protection for the entire wooded area might cost. These figures indicate that the annual cost of protection for all land in Louisiana would be between \$400,000 and \$450,000. In addition to the annual cost for fire prevention and suppression work there would be an initial expense of approximately \$100,000 for fire towers. These towers would serve twenty years or more.

Table No. 12

ESTIMATED COST OF FIRE PROTECTION FOR LOUISIANA

Classification of lands of state	Area in Acres	Per acre (Cents)	Cost per Acre. Yearly cost for fire protection based on 1½ years' work		Cost of Fire Towers *	Total
			Total			
Longleaf Lands_	6,000,095	3.8	\$234,003.70	\$	30,000.00	\$264,003.70
Shortleaf Lands_	4,614,205	1.8	83,055.69		23,000.00	106,055.69
Hardwood Lands_	11,451,270	1.0†	114,512.70		57,000.00	171,512.70
Total-----	22,065,570		\$431,572.09	\$110,000.00		\$541,572.09

*—One tower for each 200,000 acres average cost \$1,000.00 each.

†—Estimated, no figures available.

Recommendation.

The protection system thus worked out for Louisiana has proven itself to be a worthwhile contribution to timber growing in Louisiana and the South. It is successful and reasonable in cost. The forest land owners of Louisiana who are cooperating with the Division of Forestry are assured that their forest crops will have a chance to develop into useful products. Other forest land owners wish to obtain aid from the Division of Forestry in the protection of their lands. They are willing to contribute their share. The cost is very small. Other states are following Louisiana's lead. With the system thus worked out it is simply a matter of having sufficient funds to protect all of Louisiana's forest lands and

grow more timber by far than ever grew within the boundaries of the state. It is recommended that the legislature make adequate provisions for the protection of Louisiana's forest lands.

FOREST NURSERY

General Statement.

Louisiana has considerable areas of cut-over land in the pine belt that are of too poor agricultural value to be profitably farmed. On a large percentage of such lands a second-growth of timber has come in naturally and kept the land productive. But in spite of nature's attempts to maintain forest growth there remain large tracts which have been reduced, by a combination of close cutting and recurrent forest fires, to a condition from which only the actual planting of forest trees can bring them back to a state of desirable productivity. To meet this need a State Forest Nursery was established at Woodworth, Rapides Parish, Louisiana, in 1925. The third year of nursery work is drawing to a close. More than a million seedlings have been distributed to Louisiana land owners, to schools, and to organizations. Farmers have requested seedlings to be grown for posts; schools have planted trees for the beautification of their grounds; while lumber and paper companies have ordered large quantities of pine seedlings for use in their reforestation projects. Orders received last year were considerably in excess of production. These growing demands indicate a very wholesome trend and in accordance therewith, the productive capacity of the State Nursery has been increased so that approximately two million seedlings will be available for distribution this year.

Policy.

The program of nursery work of the Louisiana Division of Forestry was originally undertaken when certain funds became available for its support under a provision of the Federal Clarke-McNary law. It was



STATE FOREST NURSERY
Near Woodworth

necessary for the state to devote a part of its own appropriation for forestry to this work in order to secure the financial aid just mentioned.

The policy adopted was that of supplying farmers with planting stock at less than the cost of production, while lumber and paper companies and other large land owners would obtain stock at actual cost. It was planned to encourage this latter type of planters to establish nurseries of their own, as the Great Southern Lumber Company at Bogalusa had already done. During the past year, however, it has become obvious that the State Nursery will still be called upon to supply stock to all classes of land owners. As most of the areas in need of planting lie in the pine belt, it is natural that emphasis should be placed upon the production of coniferous stock.

In reviewing the matter of distribution of trees it should be understood that there is no conflict between the nursery work done by the Division of Forestry and that of individuals engaged in similar work along com-

mercial lines. The state nursery work is limited almost entirely to the production of forest tree seedlings, and trees are not distributed to individuals for decorative or ornamental use on privately owned lands if it is known that such use is intended. Furthermore, it is extremely doubtful whether commercial nurserymen would care to enter the field of production of forest planting stock in the face of violently fluctuating demand that may run into the millions one year and drop to a few hundred thousand the following year. The state nursery avoids the loss that commercial nurseries would sustain in this regard by using surplus quantities for planting on the state forest.

Nursery Practice—Seed Gathering.

The first step in nursery operation is the securing of seed of desired species in sufficient quantity. This is obtained by gathering green pine burrs just before they open in the fall of the year. Gathering is usually done where timber is being cut, otherwise it is necessary to climb the trees. The pine burrs thus obtained are dried and opened by exposure to the heat of the sun, after which the seed are shaken out and stored in rat-proof containers in a cool, dry place until planting time. It is possible to extract the seed from the cones by running the latter through a dry-kiln. If desired, the wings may be loosened from the seed by moistening and removed by running the seed through a cleaner. This process also removes the light, defective seed and all foreign matter.

Preparation of Seed Beds.

The general practice in growing pine seedlings at the State Forest Nursery has been to prepare the site by ploughing and harrowing after which beds four feet wide of desired length are laid out. Lanes two feet wide are left between the beds which have curbs around them made by setting 1"x4" boards two inches in the ground. It has been found advisable to prepare



Photo by Great Southern Lumber Co.
PINE PLANTATION ON LONGLEAF CUT-OVER LAND

the beds sufficiently far in advance so that the soil in them will be settled by rain and the surface can be re-levelled.

Seeding.

The surface of the bed should be reworked before the seed is broadcast over it, after which the bed is covered with burlap until germination takes place. In some cases a very light cover of soil is used before placing the burlap. The seedlings do not ordinarily need shade or other cover after germination.

Cultural Operations.

Watering by flooding the lanes between the beds has proved ineffectual, and a system of overhead irrigation has been installed at the State Nursery. This has given very satisfactory service. It is essential to have water available in quantity. Rain cannot be depended upon, as a period of drought in mid-summer would cause the loss of the entire stock in a few weeks.

Experience in weeding has shown that the only practice that will give desired results is that of keeping the nursery free from weeds at all times. This practice not only produces better plants, but greatly facilitates the lifting of the stock for transplanting.

Lifting, Packing, and Shipping.

Pine seedlings ordinarily remain in the nursery for a year. At that time they vary in height from several inches up to two feet according to species.

The removal of planting stock from the nursery is accomplished in the manner in vogue in other nurseries. The curb boards are removed and stacked. One man lifts the plants with a shovel, being careful not to damage the roots, while two others count the seedlings into bundles of one hundred each and heel them in. One man does the packing of small bundles.

Up to the present time wet shingle toes have been used about the roots when packing trees for shipment. While not as good as sphagnum moss, this material is much easier to obtain and serves the purpose very well. The roots of the plants are puddled in muddy water before packing. Both burlap and water-proof paper have been used for wrapping. The former is more satisfactory but is more expensive. The paper is easier to handle but there is some danger of loss through heating.

Distribution of Planting Stock.

Orders for trees have been obtained largely through the efforts of the Ranger Organization and the Extension Forester, though many applications were sent in as a result of the general educational work of the Division of Forestry. Compilation of the orders received to date is given below:

Table No. 13

DISTRIBUTION OF FOREST PLANTING STOCK FROM THE
STATE NURSERY

at

Woodworth, Rapides Parish, La., to date

(Nearly 90% of these trees were distributed during the 1926-27
biennial period)

Planting Agency	No. of Trees Used		Per Cent of Total
Louisiana Division of Forestry:			
Planted on State Forest-----	89,100		
Experimental Use-----	13,100	102,200	10%
Community Plantings:			
Parks -----	8,000		
Organizations -----	8,700	16,700	2%
School Plantings:			
Boys' Clubs-----	8,000		
School Plots-----	15,300		
Arbor Day-----	6,500	29,800	3%
Small Land Owners:			
Farmers and others-----		201,700	20%
Large Land Owners:			
Lumber and Paper companies--		663,400	65%
	Total ----	1,013,800	100%

It will be observed that the planting agencies listed above form several rather distinct groups. The Louisiana Division of Forestry quite naturally uses a part of the stock produced at its nursery for planting on state lands, both in connection with the development of the state forest and for experimental purposes. During the past year an endeavor has been made to secure seed of all trees native to Louisiana in order that an arboretum may be started at the State Forest.

Seedlings for community planting projects are donated to the public by the Division of Forestry. Planting by Boy Scouts and park boards, and those sponsored by Women's Clubs come under this classification.

There are several ways in which schools have used trees from the State Nursery. Schools pay only the de-

livery charge on trees sent them. The members of the Louisiana Boys' Reforestation Club have planted a number of trees on their forestry plots, and schools have used a still larger quantity on their grounds. But the most interesting development in school planting is that done in connection with the observance of Arbor Day. Three hundred and fifty school orders have been filled in the last two seasons. While approximately the same number of orders was received each year, the number of trees planted in the 1927 season was ten times as great as that used during 1926. The supply of stock for school use was entirely exhausted this year. It is hoped that the planting of trees on school grounds for ornamental purposes will lead to the more practical type of school forest planting wherever the land is available. The educational value of such work can hardly be over estimated in a state where half the labor is employed in wood-using industries. Nearly all of the orders for trees from farmers and other small land owners have been for those species best adapted for use as fence-posts. Black locust seems to be most prominently in demand, with catalpa, mulberry, and cypress in less favor. It has been with some measure of hesitancy on the part of the Division of Forestry that a program of quantity production of Black Locust has been embarked upon. In other parts of the country this specie is subject to insect depredations to a degree that makes its planting inadvisable. Correspondence with the forestry departments of neighboring states indicates that Black Locust is being successfully grown. Production at the State Nursery will be maintained within a reasonable limit until such time as results are obtained from plantings in Louisiana. It is believed that the tendency on the part of the farmer to plant the product best adapted to his immediate needs is a natural one, and that it will lead to the planting of forest trees for pulp wood and lumber in due course of time.

Most of the orders from lumber and paper companies have been obtained through the New Orleans office. Both seed and plants have been supplied to large

land owners in quantity. In every case this class of planters has paid a higher price for the trees allotted to him than farmers have paid. This is because of the Federal Forest Service subsidy for farm woodlot planting made available under the Clarke-McNary law already mentioned. All of the larger lumber and paper companies that have called upon the Division of Forestry for seed or seedlings have established forest nurseries of their own. It is possible that their activities along this line will make it unnecessary for them to call on the State Nursery for trees.

It has become evident that something further should be done to encourage planting by farmers. The field representatives of the Division of Forestry have done good work along this line, but they have little time to devote to the work in years when the fire hazard is great. Expansion of the nursery program should be predicated upon a definite demand, and the output should be as large as possible in order to keep down the cost per thousand trees. During the coming year an attempt will be made to develop new outlets for planting stock. It is believed that a natural development of the work will be gathering of seed by land owners who will send it to the nursery and let the state grow the trees for them. This has already been done in one case.

STATE FORESTS

Acquisition.

Purchase of lands for state forests is authorized by Section 13 of the forestry law. This provision was made in order that the Division of Forestry might acquire lands for the purpose of conducting experiments and demonstrations in forest development and management. The original purchase consisted of a tract of approximately 2,200 acres near Woodworth, Rapides Parish, Louisiana. The area is almost entirely covered with second-growth timber and is centrally located in the

state. Several additional tracts have been purchased during the period covered by this report.

A table showing acquisitions is given herewith:

Table No. 14

ACQUISITION OF LAND FOR STATE FOREST				
Vendor	Acres	Price	Per Acre	
Original purchase (From H. S. Burrowes) -----	2,200	\$ 125.00	\$ 1.68	**
Subsequent Purchases:—				
From Long-Bell Lbr. Co.-----	75	224.28	3.00	
From V. H. Sonderegger (Nursery included)-----	20	477.08	23.85	
From B. E. Smith-----	3,185	9,800.27	3.10	
From H. S. Burrowes-----	390	2,437.50	6.25	
Purchases during 1926-27-----	3,670	\$12,939.13	\$ 3.53	
--Total to date-----	5,870	\$25,439.13	\$ 4.33	

**—Previous to 1926.

The land obtained from the Long-Bell joined the original area and is traversed by the road to the nursery. It is well stocked with second-growth and was secured at a very good price.

A change in the forestry law was necessary to enable the Division of Forestry to purchase the State Forest Nursery site which was under lease from V. H. Sonderegger. The price was higher than the Division could pay under the old law. The fact that the nursery was already established on this area made its acquisition advisable. Of the 20 acres purchased, ten are in young longleaf timber, and ten are occupied by the nursery site.

The largest tract acquired was that obtained from B. E. Smith of Alexandria. This purchase gave the Division of Forestry the land lying between the original State Forest and the Beechwood Fish Hatchery, thus joining these two properties of the Department of Conservation.

The second purchase from H. S. Burrowes brought

the total area of the State Forest to 5,870 acres. This tract was cut over about eight years ago and all of it has reproduced naturally. The lands acquired from Mr. Burrowes are better timbered than any of the others.

All of these purchases have been made from funds saved out of the regular state appropriation for forestry. An attempt was made to secure from the last legislature a special appropriation for the purchase of State Forests but the bill did not pass. No additional purchases are contemplated at the present time as no funds are available.

Game Sanctuary.

The State Forest has been set aside as a bird and game sanctuary. No hunting or trapping is permitted on the area, it being protected as a place where wild life may increase and spread to the surrounding country where hunting is permitted during the open season. An experiment in the propagation of pheasants is now being carried on with the assistance of Dr. M. H. Foster of Alexandria. Dr. Foster donated a number of birds, and as soon as increase in numbers warrants, they will be released on the forest to spread to adjacent privately owned lands.

Development.

Development of the State Forest has already been started. More than 90,000 trees have been planted on cut-over portions of the area and a considerable amount of survey work has been done in connection with the program of land acquisition. This will be continued during the coming summer with the view of placing the entire tract under management in order to demonstrate the best methods of forestry practice as they are brought out by investigation. Improvement of the roads leading through the forest is the most necessary step toward its development, and assistance has been promised by parish and state authorities.

Public Use.

It is the policy in many states to make available to the public at nominal cost camping sites on state forests where such use is not inimical to the primary purpose for which such lands are administered. Roads now under construction or contemplated will give access to the state forest from the two main highways leading south through the state. Public camp grounds are available, and the public is encouraged to use the state forest to the fullest degree compatible with its administration for forestry purposes.

STATE PARKS

Louisiana has no mountains, grand canyons, or great waterfalls, yet our landscape has a charm all its own. With hills and plains, many beautiful streams, and a remarkable variety of trees and wild flowers, our natural scenery is very satisfying.

It is the present aim of the state to secure, by gift or purchase, areas in different parts of the state, representing the several types of scenery, forests, and other examples of natural beauty, these to be preserved and maintained as state parks. These will be kept as nearly as possible in a natural condition.

The main purposes for which these parks will be maintained may be briefly stated as follows: that our own people may have accessible to them attractive areas for their recreation; that we may preserve types of our natural landscape for purposes of scientific study; and that tourists who visit our state may see its real beauty, and thereby be tempted to come again.

In cooperation with the Louisiana Federation of Women's Clubs, the Forestry Division has made a rather thorough survey of the scenic possibilities of the state. Several attractive and advantageous locations have been recorded for possible future action.

The Longfellow-Evangeline Park has been established on the banks of beautiful Bayou Teche. This consists of fifty acres of land, with many magnificent moss-



"THERE ARE TREES FAR OFF IN THE WILDWOOD"
Kisatchie Wold, Natchitoches Parish, La.

draped live oaks. This represents one distinctive type of Louisiana scenery.

A contrasting type is the Kisatchie Wold, near the center of the state, about forty-five miles from Alexandria. A great range of sand hills extends for many miles, with rugged out-croppings of grey sandstones, fine springs, and swift, clear streams. The prevailing type of forest is longleaf pine, but there are splendid hardwood growths along the streams. Considerable progress has been made on a project to establish a state park in this region. It is accessible, by excellent highways, from every part of the state.

Louisiana hopes to build up a system of parks equal to that of any state in the Union.

GENERAL FORESTRY

Campaign of Information.

Interest in forestry has grown steadily in Louisiana since the work was given its start through legislation and appropriation in 1918. The past two years have seen this interest rapidly crystalize into a demand for real progress in the movement for rehabilitation of the forests. Progress has been made. The work of forest protection and reforestation places Louisiana well in the lead over other Southern States in the growing of new forests. The efforts of the Division of Forestry to inform the people of the state concerning these and other phases of the forest problem have likewise served to make Louisiana a leader. The value of this campaign of information is shown in the general approval given to reforestation throughout the state and the ensuing greater care given to the timber growth.

Addresses.

Addresses have been made on various phases of forestry throughout most of the state. Organizations of all kinds have been reached, civic, official and social, and gatherings of individuals from all walks of life. The personnel of the Division of Forestry has handled

many of these engagements personally, but in addition has arranged for addresses by other speakers familiar with the forestry of allied fields. During American Forest Week, of 1928, April 22 to 28, practically every active community in Louisiana will hear a talk on forestry.

Through the cooperation of the U. S. Forest Service, the Division of Forestry has been able to obtain the aid of their chief lecturer, Mr. H. N. Wheeler of Washington, D. C. Mr. Wheeler has made two visits to Louisiana during the past two years. His engagements were arranged by the Division of Forestry and addresses were made at Monroe, Ruston, Arcadia, Shreveport, Alexandria, Lake Charles, Baton Rouge, Calhoun, Many, Leesville, DeRidder, Elizabeth, Oakdale, Bogalusa, Lafayette and New Orleans. More than 7,000 people heard his talks. Mr. Wheeler's audiences were very appreciative and his work has been of inestimable value in furthering the timber growing movement.

The value of teaching the lessons of conservation and rehabilitation of the forests to the young people of the state was recognized as necessary from the very start of the work. Lectures have frequently been made in the schools. Practically every school in the pine and hardwood sections of the state and many in other sections have been addressed on the subject one or more times during the past two years. Some have been addressed several times.

In like manner the scout camps for the boys and for the girls have been attended by lecturers from the Division of Forestry. Practically every camp had a representative of the Forestry Division for a part or all of its camp period last summer. Many letters of thanks and commendation have been received from scout officials.

Publications.

The outstanding publication of the Division of Forestry during the past two years has been the bulletin on "Louisiana Trees and How to Know Them", by Caro-

line Dormon, Assistant in the Division. Ten thousand copies of the bulletin were sent out to the people of Louisiana and requests continue to come in in great numbers. The schools, boy and girl scout organizations and other groups of young people have found the bulletin particularly valuable. Many requests come from older people and from civic organizations such as the Chamber of Commerce, women's clubs, and others.

A number of shorter publications concerning different branches of the work have been put out from time to time. A five-page folder describing the Louisiana fire protection system has been published to inform people concerning this branch of the work. It has been distributed throughout Louisiana and to other states. This statement shows how Louisiana is endeavoring to assure protection to the timber growers. Within the state the paper is of interest to those who wish to know how the Division of Forestry is functioning. It also assures those from other states that timber values in Louisiana are recognized and afforded protection.

A nursery folder has been prepared to set forth the reasons for planting idle forest lands and to show how this should be done. It has been particularly useful in arousing interest in planting among the farmers and schools. A series of outlines for the study of forestry in the schools has been prepared and sent out to every school in the state. These outlines, a set of four four-page folders, suggest material on the forests and forest products that may be used in the teaching of the regular subjects. They aid the teacher where she needs suggestions for work for the pupils by briefly outlining material on forestry that could be used. In addition to the above the Division of Forestry has published a brief statement on the Division of Forestry and its work. These have been used principally at fairs.

Newspaper articles have been prepared and sent throughout the state to practically every newspaper. Interviews have been given whenever interest in the work warranted. A number of different publications by other agencies and totalling into the thousands of

copies have been distributed. While these efforts at disseminating information are not as good as could be wished, still it is believed that the public of Louisiana is better informed on the subject of reforestation and forest conservation than any of her sister states in the South.

Exhibits.

The exhibits of the Division of Forestry as shown at the fairs have attracted widespread interest. Work has been carried on along this line for a number of years. Exhibits were shown at all the important fairs during the fair season of 1926 and practically every fair was reached in 1927. It is estimated that 40,000 people viewed the fair exhibits of the Division during the fall of 1927.

The fair exhibits of 1927 differed materially from exhibits of previous years. The Extension Forester had this work in charge and under his direction the exhibits were all planned to teach one lesson, protection of the forests from fire. The exhibit of 1927 presented a model showing a sawmill town make a permanent thriving community through the protection of the forest supporting it. The state forest fire protection system was shown in the exhibit with fire towers, fire breaks, telephone lines and homes of fire fighters as actually in operation on several million acres of Louisiana forest land. The exhibit was worked out to show how this protection system is an aid in assuring a permanent supply of forest product to maintain the industries of the town. It was the more forcibly demonstrated by including on one side of the exhibit an area showing the result of neglect and frequent ravages by forest fires. This is considered the most successful exhibit ever put on by the Division of Forestry. Favorable comment was received from all over the state and requests for the loan of the exhibit were received from Arkansas and Texas.

The same idea has been worked up for a large display at the International Trade Exhibition Building. The large space available, twenty feet by forty feet,

permitted the development of the idea to include many additional interesting features. A large painting four feet high by forty feet long provides a background that emphasizes the lesson in the exhibit.

The Division of Forestry aided materially in the development of a scene-in-action display showing a forest fire. The display, as worked up, appears to show a forest fire actually burning in a forest with young and old trees (see page 40). Miss Caroline Dormon, Assistant in the Division, drew the original picture for the display. It has been adopted by the forestry organizations in several Southern States and by the U. S. Forest Service for use in the South. A number of large land owners have purchased large copies at a cost of over two hundred dollars each for use in their effort to aid in the campaign against forest fires.

Arbor Day.

The Division of Forestry has aided the people of the state, especially the young people, in the celebration of Arbor Day. A program was prepared for use in the schools, scout organizations, and for the women's clubs on Arbor Day of 1928. The program was sent to all schools and was widely used throughout the state. More than 150 schools took advantage of the free trees for the beautification of public school grounds offered by the Forest Nursery in 1928. This is the third year that trees were offered to the schools. Their interest is growing. Cooperation with the school authorities has been the best possible.

A number of schools started school forests during 1926. Trees were furnished for planting. Advice and aid were given in managing the school forest. This work could be developed until many schools could have a forest that would materially assist in paying the cost of operation. At present these forests serve as a place to study the best methods of protecting, growing and cutting a small forest or woodlot. They serve also as recreation centers for the school and community.

Essay Contest.

Several contests to arouse interest in forestry have been put on by the Division of Forestry. All of them have created interest. The most successful was an essay contest that was worked out in cooperation with the Louisiana Federation of Women's Clubs. The subject suggested was "Why We Must Stop Forest Fires in Louisiana". Information on the subject was sent to the schools throughout the state. More than one thousand essays were written for the contest. This means that this number of boys and girls have looked into the problem of protecting Louisiana's forests. Not a few of them have given evidence that they understand the problem.

Missouri Pacific Better Health and Agriculture Special Train.

The Division of Forestry was invited to participate in carrying information on better agriculture to the people along the lines of the Missouri Pacific Railroad System in Louisiana. A special train carried a corps of experts on health and various agricultural subjects. Sixty-three towns in Louisiana were visited. Mr. Canterbury of the Division of Forestry prepared a very creditable exhibit and made thirty talks in the course of the trip. He addressed approximately twenty-one thousand people.

Reforestation Contract.

The first reimbursement to the parish and state under the yield tax of the reforestation contract law was recently made in Winn Parish by the Urania Lumber Company. The seed trees on certain areas in the Urania Lumber Company contract have served their purpose and it was time they were cut to allow the young trees full room to grow. Approximately five hundred acres were cut over, yielding one thousand board feet per acre from an average of five trees per acre. The total tax paid amounts to \$180,000, of which Winn

PLEASE NOTE: ERROR PAGE 83 AND 84

SHOULD READ \$180,000, \$185,000 & \$15,000

Parish receives three-fourths or \$135,000, and the state receives the remaining \$45,000 or one-fourth. The Urania Lumber Company plans further cuttings to improve the growing conditions on its forests. Thinning and other cuttings will return a yield tax of 6% on the stumpage value of all timber cut.

This return is made in accordance with an amendment to the constitution, passed by the legislature of 1926, affecting the reforestation contract law, so called. This amendment was approved by vote of the people at the following general election. The amendment authorized the legislature to fix a limit on the yield tax on lands to be entered for contract of reforestation. This limit was set by the legislature at 6% of which three-fourths goes to the parish in which the timber is cut and one-fourth goes to the state. The limit may be raised by the legislature at its discretion. The amendment also provides that the owner who devotes his land to reforestation purposes under this contract shall not be taxed on the value of the timber prior to the time of cutting up to a maximum period of fifty years. The land will, of course, be taxed at its actual cash value. This figure will remain fixed during the period of the contract at the figure set by the police jury and may only be changed at the end of that period.

Forty-two thousand six hundred and eighty-nine and six-tenths acres have been entered for contract under the law as amended in 1926. These contracted lands were owned by sixteen farmers and two lumber companies. In addition, 169,045.9 acres that were under contract prior to the enactment of the present law have accepted its provisions.

Some little progress is shown, therefore, in getting lands definitely set aside for timber growing purposes. Other branches of the work have prevented the employees of the Division of Forestry from placing any considerable emphasis on obtaining these contracts.

Inspections have, however, been made of all areas previously placed under contract. The inspection for 1927 indicated that practically every owner with lands

under reforestation contract had fulfilled the requirements of the law. In several instances the owners of small areas had failed to make the necessary plantings or had failed to provide protection from fire. The owners and the police juries of the several parishes in which these contracts were located were advised by letter and the owner was requested to begin at once to fulfill the requirements of the law. They have done so in most instances. The holders of large contracts have pursued a vigorous policy of reforestation. All of them are paying the state for assistance in protection or are protecting their own with state aid. Several of them have forest tree nurseries in which seedlings are grown for planting on bare areas.

Three thousand seven hundred and ninety and eight-tenths acres have been withdrawn from the contract as originally made. Most of this land has been withdrawn for agricultural purposes. Three hundred and eighty-eight acres were withdrawn by the Urania Lumber Company. One area of about 1000 acres was withdrawn by the Great Southern Lumber Company for a donation to the Forestry Department of the State University. A total of 3,402.80 acres have been withdrawn from reforestation contract.

This leaves a total of 306,554.18 acres under reforestation contract today. (See appendix.) It marks the Louisiana law as the most successful of all the laws dealing with this subject throughout the entire United States. The success of the Louisiana law is due to the fact that it is an equitable law, fair to the state and fair to the land owner. Other states have similar laws. They have similar provisions for fixed assessment, period of contract and yield tax. The Louisiana law was, however, one of the first and contains about the best set of provisions—all things considered. No doubt, Louisiana will profit through encouraging reforestation, and the fact that she has a citizenship that appreciates this, has had considerable bearing on the success of this law.

INVESTIGATION OF HARDWOODS

The study of Louisiana hardwoods is a cooperative project conducted by the Division of Forestry and the Southern Forest Experiment Station of the U. S. Forest Service. The active field work of this project has been carried on for a period of about three months, with Mr. G. H. Lentz of the Division of Forestry in charge. Although it is too early to make any very definite statements or draw conclusions it might not be amiss to mention what has been done and to sketch briefly the plans for the balance of the year.

In looking over the available data relating to the hardwoods it was found that very little definite information was on hand concerning them. It was thought advisable therefore to obtain a full list of the hardwood sawmill operators in the South and to send a questionnaire to each. Through the cooperation of the Hardwood Manufacturers' Institute, the Southwestern Hardwood Manufacturers' Club, and the Southern Lumberman it was possible to obtain a list of the sawmill operators in Louisiana, Arkansas, and Mississippi. A form letter accompanied by a questionnaire was sent to each operator asking for information concerning his timber holdings, occurrence of fires, methods of cutting, etc. The replies received to these questionnaires gave a starting point for our work.

The first field trip was in the nature of a very extensive survey covering Ouachita, Franklin, Richland, West Carroll, and Madison Parishes. On a subsequent trip a visit was made to each parish seat and information concerning the larger hardwood areas was obtained through the Tax Assessor's office. The location of the timber areas of 1000 acres or more was plotted on a large scale map of the parish. These maps have been used as a basis for locating areas to be worked in. To date ownership maps have been made for the following parishes: West Carroll, East Carroll, Morehouse, Ouachita, Franklin, Richland, Madison, Tensas, Concordia, Catahoula, LaSalle, Avoyelles and Rapides.

Hardwood mills operating in the above parishes

have been visited and where feasible trips have been made to the woods.

On February 24th, Mr. Putnam's services were secured by the Experiment Station and he was assigned to the hardwood study. With his assistance it has been possible to make more detailed studies, run strip lines, and measure individual trees. Detailed studies have been made in West Carroll and Madison Parishes. Survey strips have been run through various stands typical of the region to determine the distribution of species, stand per acre, the occurrence of fires and the effect of the 1927 flood upon the hardwood reproduction.

In each of the 13 above mentioned parishes serious fire damage to both the young growth and the mature timber has been noted. Individual stands that were studied showed that 60 to 70 per cent of the trees were fire scarred. The fires occurring in 1924 and 1925 seem to have been particularly widespread but other fires occurred in the same areas in 1915 and also about 1894. The damage caused by these fires is plainly evident in the form of hollow butt logs, decayed heartwood, fire killed trees, and retarded growth.

The damage to young hardwood growth by the flood waters of last spring and summer has been quite noticeable in sections where the water stayed for a period of two to three months and where it covered the young growth. Trees that were completely covered were killed while the submerged branches of the taller trees were also killed.

It is planned to carry these studies into the other parishes where the hardwood bottomland type occurs to see if this fire and flood damage is common to all.

Scattered through the virgin and older stands of hardwood we have found stands of second growth. In several instances it has been possible to trace the past history of these areas and to find that they were under cultivation prior to the Civil War. These areas have seeded in to cottonwood, white ash, oak, or gum depending upon the site and also no doubt upon the presence of seed trees of the various species that may have been



(Courtesy Southern Forest Experiment Station)
FIRE DAMAGE IN HARDWOODS
 In Mississippi Bottomlands

present when the fields were abandoned. From a study of such areas we hope to be able to obtain growth and yield figures applicable to second growth stands.

There are many problems in connection with the handling of our southern hardwoods that will require years to solve. The work it will be possible to do within the period of a year may be more extensive than intensive but it is hoped that it will form a foundation on which other investigations can be based.

FARM FORESTRY

Importance.

There are 132,450 farms in Louisiana having an average acreage of about 78 acres. Approximately one-third of the total farm acreage or about 26 acres for the average farm is in woods. The total acreage of



(Courtesy Southern Forest Experiment Station)
THE STRUGGLE AGAINST FIRE
 Longleaf that has sprouted many times

Louisiana farms in woods is slightly over three and a quarter millions of acres.

The products grown upon these farm woods include sawlogs, pulpwood, poles, piling, ties, fence posts, fuel, cooperage stock, veneer stock and various others. Wise farm management requires that every acre of land produce the maximum of each crop at the minimum cost and that the crop be marketed to advantage. Timber is as much a farm crop as cotton or corn and should be managed with this idea in mind. Every acre of farm land that is not needed for the cultivation of staple crops should be growing timber. Idle, uncultivated acres of worn out or cut-over lands produce no income, hence are a burden to the farmer, because the productive acres must pay the carrying charges for themselves and for the idle acres as well.

For assisting farmers in their farm forest problems, the Extension Service of Louisiana State University co-operates with the United States Department of Agriculture and the Division of Forestry in employing an



REFORESTATION BOYS' CLUB PLOT
 These boys have learned to thin a young stand



(Courtesy Southern Forest Experiment Station)
FIRE DAMAGE ON ONE-QUARTER ACRE
 Practically every tree was killed by fire that burned
 only one-quarter acre

Extension Forester with headquarters at Baton Rouge in the Extension Service.

Farm Woods Management.

Successful farm woods management has as its ideal the production of a timber crop in such a manner that the owner may be able to harvest forest products either annually or periodically. The management of the woods depends upon the products the owner ultimately wishes to obtain. In general, the products that are most profitable to grow are sawlogs and pulpwood. The decision whether to grow the one or the other depends on the locality in question, that is, if a man lives near a paper mill he will find it more profitable to grow pulpwood, but if no pulp mill is available, it will be more profitable to grow sawlogs.

The length of time required to produce sawlogs on average land is about 40 years, while pulpwood can be produced in 20 to 25 years. In a sawlog stand, often 25% to 40% of the stand will be salable for piling or poles, ordinarily bringing a better price than sawlogs.

The first consideration in starting a young stand for the production of timber is the density of the stand. The number of trees per acre is a very important factor in the amount of material that an acre will produce and very materially affects the quality of the product. Full stands of trees grow tall and straight and the lower limbs will soon die and fall off, with the result that high grade lumber is produced in the logs on the lower part of the trunk. Openings in a young stand should be filled in by planting seedlings obtained from the State Forest Nursery or transplanted from the nearby woods.

After a full stand has been obtained, it will grow in height and diameter rapidly, and certain of the more thrifty trees will soon overtop the less thrifty. These less thrifty trees will grow more slowly than at first, since they are able to get less light. Some of them will die out each year. After a period of 15 to 20 years, the less thrifty trees should be of sufficient size to make fence posts, mine props or even pulpwood. Allowing

for the natural dying out of the trees in the stand till the age of 20 years, there should be about 800 trees per acre in a full stand at this age.

Such stands will be found to be in need of thinning. That is, by the time the stand has become twenty years of age the trees have grown to such size and their food and light requirements have increased to such an extent that they are crowding each other severely and will slow down in their rate of growth unless they are allowed more room for development.

Contrary to the general opinion of the layman, the larger trees in such a stand should be left to develop, and the smaller overtopped trees should be removed. If the larger trees are removed, it will be several years before those that are left will respond to the better light and soil conditions on account of their weakened state. The larger trees, however, are not in a weakened condition and will quickly respond to their release and start growing as fast as they did when much younger.

The smaller trees may be sold for fence posts, mine props, and used for fuel. The cutting of these trees will always pay for the labor of removal, if they are marketed to advantage to companies who deal in the above products.

Enough of the original stand should be removed to allow a small space between the tops of the trees to be left. No definite rules for thinnings can be laid down since each stand will differ. In general, a twenty-year-old stand that is fully stocked should be thinned to about two hundred trees per acre. The actual selection of the trees to be removed should be made by examining the tops of the trees and those surrounding them. Remove only those whose tops are below the general level of the tops of the larger trees, or whose trunks are too crooked or deformed to develop into good straight, sound timber. A uniform spacing of the trees after the thinning has been made is desirable in order that each tree may have an equal chance with its neighbor.

Recently, thinnings in stands described above have been made. The original stands contained about 30

cords per acre, and when the stand was thinned in such a manner as to remove two-thirds of the number of trees (only the smaller ones), it was found that there still remained three-fourths of the volume, or about 22.5 cords. Seven and a half cords were removed and sold for pulpwood at the rate of \$5.00 per cord, delivered at the car, or a return of \$37.50 per acre delivered.

After the stand has been thinned, the growth of the remaining trees will be accelerated as mentioned before. By the action of thinning the stand, the length of time required to produce the mature sawtimber is reduced by several years. After another five to ten years, the remaining stand will have become crowded and should again be thinned. In this thinning, the same rules apply governing the selection of those trees to remove. Usually one-third to one-half the trees should be removed in the second thinning. Shortly after the second thinning the timber will have reached sufficient size for harvesting for poles, piles and sawlogs.

In harvesting the mature timber, two to five trees should be left on each acre, well distributed. The purpose of leaving these trees is for the production of seed to form a new crop of trees. In shortleaf, loblolly or slash pine stands, a new crop of young trees should be established in one to three years. Often a longer time is required in longleaf pine stands since this species usually produces seed only once in six or seven years in such a quantity as to be sufficient to seed in an area fully. After the new stand has been established the seed trees that were left may be removed and sold, or used on the farm as needed.

If the farm woods area can be subdivided into several areas each having young timber of different ages, it will be possible for a farmer to cut forest products from his woods very frequently. An example of this is a farm woods in Sabine Parish. The whole woodland on this farm contains 130 acres. There is about 40 acres in virgin timber which is ready to harvest. Another part of the woods contains 30 acres of loblolly pine about 22 years old. This pine needs thinning and

it is estimated that a proper thinning would remove 180 cords of pulpwood or 10,000 fence posts if sold for posts rather than pulp. The value of these thinnings would amount to about \$700.00 delivered at the railroad.

Another 40 acres contains young pine eleven years old and the remaining 30 acres is young pine three years old. The eleven-year-old stand will be ready to thin for posts or pulp in about 10 years and the youngest stand will be ready in about 16 years. Such a farm woods provides income for the farmer every few years as against a very infrequent return on woodlands where timber is all the same age.

Certain localities in Louisiana receive extra annual dividends from their pine lands in the form of pine straw for mulching strawberries. The returns in terms of straw varies with the density of the pine timber. Scattering trees shed relatively fewer needles per acre than in close stands. The value of the pine straw on the ground in the strawberry belt often amounts to several dollars per acre per year.

Fire Prevention.

Successful handling of any man's farm woods demands that fires be kept out of the woods. Cattle and timber can be successfully raised in the same land, but not if the land is burned off every year.

Burning reduces the fertility of the soil by destroying the organic matter on top of the ground. Fires kill the better types of forage grasses, including lespedeza, carpet grass and switch cane, making the grazing poorer for the cattle.

Insofar as growing timber is concerned, fire is the greatest enemy to good growth. Young stands of shortleaf, loblolly or slash pine may be killed even when they are 20 feet tall. The shortleaf pine may sprout from its roots but even then it is set back several years. In older stands of timber a large percentage of the trees will be scarred on the butts. This produces poor timber in the butt log which is ordinarily the best timber in the tree. In any event the growth of the timber is

reduced both because of the damage done to the tree itself because the burning of the litter and leaves on the ground reduces the fertility.

Longleaf pine is killed by annual burning when young. After it gets above 18 inches to two feet tall its growth in height is reduced to one-third normal by annual winter fires. Summer fires are much more destructive than winter fires. Longleaf pine up to six or eight feet in height may be nearly all wiped out by one summer fire.

Hardwoods are much more susceptible to fire and the after effects than are pines. The bark of hardwoods is much more tender and one fire may make fire scars on most of the trees in a woodland. Fungi and insects can enter the tree through these scars and cause the rotting of the trunk at this point. The pitch from pine trees quickly heals over many of these wounds, but hardwoods are unable to exude any form of pitch to heal their scars.

Adequate fire protection for farm woodlands consists in plowing fire breaks completely around the woods and if there are roads passing through them at intervals these roads should be kept clean of needles, leaves or other inflammable material. These fire breaks will serve as a point from which to fight approaching fires.

Reforestation.

Worn out old fields or pastures which are not to be used for cultivation may well be planted in pine trees for the production of timber or in black locust for the production of fence posts. Seedlings for such planting are furnished by the State Forest Nursery at Woodworth at a nominal charge. The cost of planting such land should not exceed \$5.00 per acre including the cost of the trees and the labor.

Fence Posts.

The fact that many species of timber trees decay so rapidly in contact with the soil, presents a problem to the farmer who uses a considerable number of fence

posts. Only the heartwood of longleaf pine, white oak, or cypress can be expected to last more than four or five years. Mulberry and black locust are durable but scarce. Other species decay in from one to four years.

For the production of durable fence posts black locust is being planted considerably. Durable fence posts may be produced in ten years by planting this species.

For the production of durable fence posts black gums, red oak and sap cypress, they may be readily creosoted at home or commercially creosoted posts may be purchased at reasonable rates. The annual cost of creosoted fence posts is less than the annual cost of untreated posts. In addition, the use of creosoted posts saves considerable labor each year in replacing decayed or worn out posts. Creosoted posts may be expected to last from 20 to 35 years according to the place where they are set and whether or not they are subjected to mechanical injury.

Information on Forestry for the Farm.

Information on all phases of farm forestry, including management, fence post treatment, planting and fire protection is free to all farmers through the field staff of the Division of Forestry and also through the county agents of the Extension Division, Louisiana State University.

Demonstrations in these practices are held from time to time by the county agents and extension forester. Boys and girls enrolled in 4H clubs and urged to take up forestry club work, consisting of fire protection on their home woods. In certain parishes where possible these club members also protect portions of the large units under state supervision.

Bulletins on farm forestry may be obtained free of charge from the Division of Forestry or from the Extension Forester at Louisiana State University.

During the past year 27 demonstrations were completed covering 1228 acres of farm woods. Forty-nine forest plantings were made on an area embracing 630

acres. The total number of farms improving this practice on their farm woods was 56. Addresses were made to over 3,000 people by the Extension Forester in 24 lectures.

Considerable interest is being manifested in this phase of the work and more and better results are expected during the next year.

Conclusion.

Progress has been made in the program of timber growing in Louisiana during the past two years. There remains much to be done. Three-fourths of Louisiana's forest lands received only the aid of an educational campaign for the prevention of forest fires. The problem of reforesting lands that cannot restock naturally is a stupendous task and requires a greatly enlarged planting policy to restore these lands to usefulness. The many problems of timber growing must be solved and the benefit of the findings must be made available to all the people of Louisiana. The task is well worth the most careful study by every Louisianian.

It is desired to extend a word of appreciation to the various agencies that have aided the Division of Forestry during the past year. No mention can be made of the organizations for the list will include most of the organizations of the state. The assistance which has been given so freely during the past two years accounts largely for the progress made. It is hoped that the efforts of the Division of Forestry will continue to merit this cooperation in the future.



PROTECTED FOREST LAND

GENERAL FORESTRY GOVERNING BOARD

V. K. Irion	Ex-Officio Member and Chairman
	New Orleans
J. G. Lee	Ex-Officio Member
	Professor of Forestry at Louisiana State
	University
W. H. Sullivan	Bogalusa
B. F. Smith	Elizabeth
Q. T. Hardtner	Urania
Mrs. A. A. Anding	Opelousas

DIVISION OF FORESTRY

Department of Conservation Louisiana

W. R. HINE, Director and State Forester.
 N. D. CANTERBURY, Assistant State Forester.
 D. B. DEMERITT, Extension Forester*.
 CAROLINE DORMON, Assistant in Public Relations
 SAM MORGAN, Inspector.
 G. H. LENTZ, Research Assistant.

FOREST RANGERS

N. CORE, Folsom	W. E. SHELL, Olla
C. N. BILBRAY, DeRidder	W. H. THOMPSON, Alexandria
G. F. HENNIGAN, Fields	E. M. THORNTON, Monroe

ASSISTANT FOREST RANGERS

W. M. BAKER, Jena	C. O. GILL, Leesville
G. C. BOSWELL, Many	S. J. HART, Chesbrough
F. CAGLE, Merryville	D. McCARTNEY, Urania
J. M. DUPUIS, DeRidder	G. McCASKLE, Olla
O. C. EDWARDS, Bienville	D. F. SIGLER, Oakdale
T. R. FAYARD, Springfield	E. SINGLETARY, Slidell
D. FOIL, Franklinton	B. F. WOMACK, Liverpool

14 Fire Lookouts

136 Fire Wardens

C. F. DELANEY, State Forest Custodian
 L. DELANEY, Nurseryman
 W. H. HUMBLE, Inspector, Reforestation Contract Areas.

*Employed cooperatively by Louisiana Division of Forestry, Extension Service, Louisiana State University, and U. S. Dept. of Agriculture.

APPENDIX

Table No. 15
REFORESTATION CONTRACTS

	OWNER	PARISH	Area in Acres	Date Contracted	Period of Contract	Asses'd Value
1.	Urania Lumber Company.	Winn, Caldwell and LaSalle.	25,749	June 14, 1913.	40 years	1.00
2.	Q. T. Hardtner & G. M. Tannehill.	LaSalle and Winn.	2,440	August 12, 1913.	40 years	1.00
3.	Great Southern Lumber Company (1).	Washington	53,267.18	October 6, 1922.	15 years	3.00
4.	J. A. Knight.	Washington	100.88	March 2, 1923.	15 years	3.50
5.	Ed. Langhurst.	Washington	1,023.65	March 2, 1923.	15 years	3.00
6.	J. S. Knight (Mrs.).	Washington	130	March 2, 1923.	15 years	3.00
7.	Crossett Land & Development Co.	Morehouse	57,691	September 6, 1923.	15 years	3.00
8.	Henry Williams.	Washington	120	September 17, 1923.	15 years	3.00
9.	H. H. Williams.	Washington	420	September 17, 1923.	15 years	3.00
10.	O. P. Schexnayder.	Washington	1,080	September 27, 1923.	15 years	3.00
11.	C. B. Jones.	Washington	80	September 18, 1923.	15 years	3.00
12.	M. C. Pool.	Washington	120	September 18, 1923.	15 years	3.00
13.	G. M. Parks.	Washington	80	September 18, 1923.	15 years	3.00
14.	Great Southern Lumber Company (2).	Washington	3,681.97	February 1, 1924.	15 years	3.00
15.	Krause-Managan Lumber Company.	Allen	22,591.50	September 11, 1924.	40 years	3.00
16.	Great Southern Lumber Company (3).	Washington	14,810.86	June 6, 1924.	15 years	3.00
17.	Thistlethwaite Lumber Company.	St. Landry	11,300	February 2, 1925.	30 years	3.00
18.	A. D. Kemp.	Washington	230	March 5, 1925.	20 years	3.00
19.	Mrs. Ann Hodge.	Washington	55	March 5, 1925.	20 years	3.00
20.	F. O. Bateman.	Washington	60	March 5, 1925.	20 years	3.00
21.	F. L. Smith.	Washington	90	March 5, 1925.	20 years	3.00
22.	H. S. Hodge.	Washington	67	March 5, 1925.	20 years	3.00
23.	L. L. Bankston.	Washington	180	March 5, 1925.	20 years	3.00
24.	M. A. Thigpen.	Washington	155	March 5, 1925.	20 years	3.00
25.	W. B. Jones.	Washington	80	March 5, 1925.	20 years	3.00
26.	M. F. Magee.	Washington	130	March 5, 1925.	10 years	3.00
27.	Mr. and Mrs. R. Y. Byrd.	Washington	185	March 5, 1925.	15 years	3.00

28.	W. E. Shell	Washington	118	March 5, 1925	20 years	3.00
29.	Great Southern Lumber Company (4)	St. Helen	21,404.41	March 2, 1925	20 years	6.00
30.	Emil Meydrich	Rapides	50	September 28, 1925	25 years	5.00
31.	Frank Bysovec	Rapides	15	September 28, 1925	25 years	5.00
32.	Rogers Bros. (K. B. & J. J. Rogers)	Rapides	200	September 28, 1925	25 years	5.00
33.	Britt Bros. (by E. Britt)	Rapides	40	September 28, 1925	25 years	5.00
34.	R. W. Robertson	Rapides	6	September 28, 1925	25 years	5.00
35.	F. D. Holt	Rapides	30	September 28, 1925	25 years	5.00
36.	J. I. Garland	Allen	20	September 28, 1925	25 years	5.00
37.	W. W. N. Garlington	Allen	18	December 10, 1925	30 years	3.00
38.	G. A. Perkins	Allen	10	December 10, 1925	30 years	3.00
39.	Mrs. G. M. Houston	Allen	120	December 10, 1925	30 years	3.00
40.	T. J. Baggett	Allen	100	December 10, 1925	30 years	3.00
41.	H. C. Morrow	Allen	120	December 10, 1925	30 years	3.00
42.	Tom Carlisle	Allen	2	December 10, 1925	30 years	3.00
43.	Luther Johnson	Allen	10	December 10, 1925	30 years	3.00
44.	J. M. Sigler	Allen	20	December 10, 1925	30 years	3.00
45.	Milton O'Quinn	Grant	80	February 26, 1926	30 years	3.50
46.	R. P. Robertson	Grant	20	February 26, 1926	30 years	3.50
47.	Thompson-Ritchie Grocery Co.	Grant	360	February 26, 1926	30 years	3.50
48.	Mrs. Mollie Williams	Grant	70	February 26, 1926	30 years	3.50
49.	Mrs. Dollie Robertson	Grant	40	February 26, 1926	30 years	3.50
50.	J. N. Warner	Grant	800	February 26, 1926	30 years	3.50
51.	J. A. Swor	Grant	30	February 26, 1926	30 years	3.50
52.	Great Southern Lumber Company (5)	Livingston	18,080.48	March 20, 1926	50 years	5.00
53.	Industrial Lumber Company	Allen	24,849	January 13, 1927	40 years	3.00
54.	T. C. Lincecum	Grant	250	June 6, 1927	15 years	4.50
55.	E. I. Morrison	Grant	222	June 6, 1927	10 years	4.50
56.	John T. Gilman	Rapides	80	May 18, 1927	30 years	4.00
57.	Mrs. Maude Daniel	Washington	50	March 4, 1927	30 years	3.00
58.	John Whittington	Washington	50	March 4, 1927	30 years	3.00
59.	N. Parker	Grant	20	June 7, 1927	20 years	4.00
60.	Henry Sands	Grant	80	May 26, 1927	20 years	4.00
61.	Mrs. S. J. Duke	Grant	10	June 3, 1927	10 years	4.00

	OWNER	PARISH	Area in Acres	Date Contracted	Period of Contract	Asses'd Value
62.	W. D. Melton.....	Winn	80	July 5, 1927.....	20 years	3.50
63.	N. Parker.....	Winn	30	July 5, 1927.....	20 years	3.50
64.	W. L. Dark.....	Winn	25	July 5, 1927.....	20 years	3.50
65.	J. El. Carter.....	Winn	160	July 5, 1927.....	20 years	3.50
66.	Dr. J. D. Woolworth.....	Sabine	1,020	August 8, 1927.....	20 years	4.50
67.	W. C. Budemer.....	Grant	130	June 8, 1927.....	20 years	4.00
68.	Chas. Williams.....	Washington	76	March 4, 1927.....	20 years	3.00
69.	Great Southern Lumber Company (6).....	Washington	15,577.70	March 20, 1928.....	40 years	5.00
			Total Acres.....			
			309,956.98			
			*Lands withdrawn for agricultural development			
			3,402.80			
			Area under contract 4/1/28.....			
			306,554.18			

*Lands withdrawn for agricultural development

Area under contract 4/1/28.....

TABLE 16
Classification of the Land Area of Louisiana According to
Louisiana Tax Commission Report, 1926
LAND USE
(Area in Acres)

GRADE OF LANDS	AGRICULTURAL	FOREST										OTHER		
		PINE		CYPRESS		HARDWOOD		WOOD LAND	LAND-TIMBER OWNED BY ANOTHER	Sea Marsh Land	Fresh Water Marsh Land	Miscellaneous		
		Uncut	Denuded	Uncut	Denuded	Uncut	Denuded							
Not Graded.....	1,112,733	.....	756,618	.....	60,128	.....	1,136,375	.....	3,056,414	484,255	.....	.....	.....	536,695
Class A.....	.....	1,373,910	.....	3,415,459	.....	440,360	.....	869,157	.....	.....	370,513	.....	772,062	.....
Class B.....	.....	2,077,998	.....	3,354,448	.....	959,103	.....	1,533,950	.....	.....	1,952,263	.....	1,051,101	.....
Class C.....	.....	2,177,319	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	1,112,733	5,629,227	756,618	6,769,907	60,128	1,399,463	1,136,375	2,403,107	3,056,414	484,255	2,322,776	1,823,163	.....	536,695

TOTAL FOR STATE.....27,490,861
PER CENT FOREST GROWTH.....58.4

Table No. 17
 LUMBER PRODUCTION
 LOUISIANA AND THE UNITED STATES
 1907-1925
 Data—U. S. F. S.

Year	Louisiana's rank among states	Louisiana board feet	United States, including Louisiana	Per cent Louisiana of total
1907	2nd	2,972,119,000	40,256,154,000	7.4
1908	2nd	2,772,421,000	33,224,369,000	6.3
1909	2nd	3,551,918,000	44,509,761,000	8.0
1910	2nd	3,733,900,000	40,018,282,000	9.3
1911	2nd	3,566,456,000	37,003,207,000	9.6
1912	2nd	3,876,211,000	39,158,414,000	9.9
1913	2nd	4,161,560,000	38,387,009,000	10.8
1914	1st	3,956,434,000	37,346,023,000	10.6
1915	2nd	3,900,000,000	38,000,000,000	10.3
1915	2nd	4,200,000,000	39,807,251,000	10.5
1917	2nd	4,210,000,000	35,831,239,000	11.7
1918	2nd	3,450,000,000	31,890,494,000	10.8
1919	2nd	3,163,871,000	34,552,076,000	9.2
1920	3rd	3,120,000,000	33,798,800,000	9.2
1921	3rd	3,215,110,000	29,960,864,000	10.7
1922	3rd	3,386,000,000	31,568,880,000	10.7
1923	3rd	3,554,212,000	37,165,505,000	9.6
1924	3rd	3,396,940,000	35,930,986,000	9.5
1925	3rd	3,293,091,000	38,338,641,000	8.6

Table No. 18
LUMBER PRODUCTION IN LOUISIANA—1925
Data—U. S. F. S.

Kind or Species	Louisiana Production M. ft. B. M.	Per cent of U. S. Total	Average value per M. ft. B. M. F. O. B. Mill	Total Value F. O. B. Mill
Yellow Pine-----	2,289,846	17.3	\$30.45	\$69,725,810.70
Cypress -----	274,040	30.4	46.39	12,712,715.60
Red Gum-----	271,415	24.6	31.63	8,584,856.45
Oak -----	221,863	10.4	35.95	7,975,974.85
Tupelo -----	100,395	45.6	24.27	2,436,586.65
Ash -----	33,589	18.8	45.01	1,511,840.89
Cottonwood -----	17,746	12.5	28.90	512,859.40
Elm -----	14,915	7.8	30.26	451,327.90
Yellow Poplar-----	8,579	2.3	34.43	295,374.97
Hickory -----	5,143	6.5	38.55	198,262.65
Beech -----	2,037	1.1	29.21	59,500.77
Sycamore -----	1,762	7.2	29.59	52,137.58
Cedar -----	386	.1	38.80	14,976.80
Maple -----	201	.02	39.18	7,875.18
Walnut -----	153	.2	111.53	17,064.09
Basswood -----	32	.02	39.76	1,272.32
All Others -----	50,989*	.3‡	63.06	3,215,366.34
Total -----	3,293,091	8.6	\$23.61	\$107,773,803.14

*—Includes mahogany, magnolia, willow, pecan, cherry, dogwood, hackberry, and locust.

‡ Includes many species not found in Louisiana such as douglas fir, balsam, spruce, etc.



A NATURAL GAS WELL "COMES IN"
Typical scene in the Carterville area of North Louisiana

Report of the Division of Minerals

WILLIAM F. CHISHOLM, Director

This report covers the oil, gas, and other mineral production for the state during 1926 and 1927 and attempts to point out some of the requirements for future development of industrial activity based on mineral resources. These subjects are considered under the following headings:

Oil

Gas and Carbon Black

Sulphur

Salt

Undeveloped Mineral Resources

Clay Survey

Conservation Activities

Conservation Laws and Regulations.

The report is accompanied by various tables and figures in addition to and explanatory of the text. Under the heading "Undeveloped Mineral Resources", the Director of the Minerals Division has taken the liberty of quoting freely from Dr. Henry Mace Payne's "Undeveloped Mineral Resources of the South" recently published by the American Mining Congress.

OIL

The present status of the oil industry is indicated by a comparison of the drilling permits issued by the Minerals Division in 1926 and 1927. In 1926 the permits to drill numbered 1,311. In 1927, drilling permits fell off to 808. This condition has not been confined to the state but is general throughout all the oil producing areas. In this connection a study of average prices of Louisiana crude during the last five years is interesting. Table VII shows the average prices in effect from 1924 to 1927, and the present posted price (Feb. 21,

1928). During 1926 there was some slight recovery in crude prices but 1927 averages and the posted prices of the early part of 1928 are most discouraging. The outlook for 1928 is far from bright. Some slight decline has been noted in the flush production in the Seminole Field in Oklahoma, but West Texas carries a serious threat. Mexican competition is declining but Venezuelan production is increasing at such a rate as to constitute a further menace to domestic production. Two or three years more may suffice to bring about active competition from Mesopotamian fields. An even more serious menace is possible in the reported discovery and plans for development of 21 new producing sands, each with a potential production greater than Seminole, in the Baku Field in Russia. The high efficiency in field operations from prospecting to production, and the great improvement in refining methods have been a small factor in bringing about the present depression. The depression is due primarily to the fact that the leasing system used by the industry leads to overproduction whenever a field of major proportions is opened up. The great bulk of the overproduction now overloading the market comes from a few wells in new fields. Lease obligations compel drilling of offsets to producing wells, and drilling of offsets to successful offsets, until the limit of the field is reached. This leads to extremely rapid drilling-in of the whole area of the field and the opening up of production capacity far in advance of the market. Any attempt of the states or the industry to meet the situation by curtailing drilling and production through agreement brings about the possibility of Federal prosecution on the ground that such agreements constitute a combination in restraint of trade. No plan has yet been proposed which will solve the difficulty, but never before in the history of the industry has cooperative effort toward elimination of the overproduction problem been so much in evidence. The collaboration of the Federal Oil Conservation Board, the American Petroleum Institute, the Mid-Continent Oil and Gas Association, and practically all the pro-

ducers' and marketers' organizations may possibly bring about the change in methods necessary to protect the industry against the temporary floods of crude oil that every now and then wash the bottom out of the market, and throw thousands of employees out of work.

Louisiana has not experienced any overproduction within her borders during 1926 and 1927, but the state has felt the full effect of the depression started by the Seminole flush oil and maintained by the threat of the opening of further highly productive areas in West Texas. Not only the oil producing states but the whole country feels the depression. The oil industry has become such an important feature of the industrial life of the nation, that its depression reacts throughout the business structure. Some idea of the tremendous effect on the general industrial situation may be gleaned from the fact that the oil industry numbers over 1,100,000 employees, not including 225,000 filling station operators, and 1,500,000 stockholders and royalty owners,—a total of 2,825,000 people more or less dependent on the earning power of the industry. The figures on investment are equally impressive. The oil industry represents an investment of \$11,300,000,000 in production, refining, and marketing of oil and its products. (Fig. 3.) It is needless to add that depression in an industry of this magnitude threatens the national prosperity.

Table I shows the number of permits issued by the Minerals Division since 1920. It will be noted that 1926 shows an increase over the former peak year, 1920. A considerable part of this 1926 activity is represented by shallow geologic tests along the Angelina-Caldwell monoclinal flexure drilled in the attempt to find another Urania field. Practically all this extensive wildcatting was unsuccessful. The search for shallow oil, however, did aid in bringing about the discovery of the great Richland Parish gas field, for the oil companies, after repeated failures along the flexure in the central and western parts of the state, turned their attention to the northeastward bend of the monocline passing through Caldwell Parish and sweeping around

the Monroe Field. In drilling out this hitherto lightly prospected area, the companies encountered an unexpected geologic situation which upset all calculations. This subject is further discussed under the notes on the Richland gas field.

Tables II and III show a classified list of permits for 1926 and 1927 by parishes. Table IV shows the production of the South Louisiana fields since 1920. Sweet Lake in Cameron Parish, Fausse Pointe in Iberia Parish,

Table I

**TOTAL NUMBER OF PERMITS ISSUED BY MINERALS DIVISION
FOR OPERATIONS 1920 to 1927, INCLUSIVE**

Parish—	1920	1921	1922	1923	1924	1925	1926	1927	Total
Acadia -----	17	34	20	12	29	38	46	42	238
Allen -----	2	1	0	0	0	0	0	0	3
Ascension -----	0	0	0	0	1	3	0	6	10
Assumption -----	0	1	0	0	0	1	2	6	10
Avoyelles -----	1	4	0	0	0	1	0	0	6
Beauregard -----	0	3	1	2	0	2	2	0	10
Bienville -----	13	16	9	15	7	5	3	8	76
Bossier -----	63	43	232	207	141	94	102	90	972
Caddo -----	354	258	261	361	303	294	435	428	2694
Calcasieu -----	81	36	65	81	88	173	143	120	787
Caldwell -----	4	2	0	2	1	3	14	16	42
Catahoula -----	1	0	1	0	0	2	7	5	16
Claiborne -----	663	511	644	132	127	99	78	87	2341
Cameron -----	4	4	7	10	20	16	17	37	115
De Soto -----	121	72	61	80	43	45	43	37	502
Evangeline -----	0	3	4	4	9	5	6	3	34
East Baton Rouge -----	0	0	0	0	0	1	0	0	1
East Carroll -----	0	0	0	0	0	0	5	2	7
East Feliciana -----	0	0	0	0	0	0	1	0	1
Franklin -----	0	3	0	0	0	0	9	11	23
Grant -----	2	0	0	0	3	4	63	40	112
Iberia -----	0	2	6	7	0	5	7	14	41
Iberville -----	1	1	0	0	0	0	0	4	6
Jackson -----	3	2	0	1	0	1	10	3	20
Jefferson Davis -----	20	8	3	9	2	31	22	9	104
Lafourche -----	0	0	1	1	0	1	2	3	8
La Salle -----	4	0	1	4	10	60	549	69	697
Lincoln -----	6	1	2	6	6	7	10	0	38
Lafayette -----	0	0	0	1	0	0	0	0	1
Livingston -----	0	0	0	1	0	0	0	0	1
Morehouse -----	13	13	28	57	32	8	23	31	205

Table I—Continued

Parish—	1920	1921	1922	1923	1924	1925	1926	1927	Total
Madison -----	0	0	0	0	0	0	1	1	2
Natchitoches -----	3	3	2	3	0	4	34	29	78
Orleans -----	1	0	0	0	0	0	0	0	1
Ouachita -----	21	20	45	76	93	19	66	38	378
Plaquemine -----	0	0	1	0	1	0	0	0	2
Pointe Coupee -----	0	0	0	3	0	0	0	0	3
Rapides -----	5	0	0	1	0	2	4	5	17
Red River -----	316	110	50	72	66	103	69	51	837
Richland -----	2	0	3	2	0	0	13	62	82
Sabine -----	7	9	9	11	10	10	19	51	126
St. Bernard -----	0	0	4	0	0	0	0	0	4
St. Landry -----	0	1	0	1	2	1	1	0	6
St. Martin -----	10	27	11	6	3	6	20	7	90
St. Mary -----	0	3	3	4	1	7	22	8	48
Tensas -----	0	0	0	0	0	0	1	0	1
Terrebonne -----	2	7	7	2	2	1	4	18	43
Union -----	16	3	12	19	51	26	22	20	169
Vernon -----	6	0	0	0	0	0	0	2	8
Vermilion -----	0	0	1	0	1	3	0	0	5
Webster -----	18	36	67	35	148	172	50	63	589
West Carroll -----	0	0	0	0	3	0	0	3	6
West Feliciana -----	1	1	3	0	3	0	1	0	9
Winn -----	0	8	4	0	1	5	50	23	91
Total -----	1781	1246	1568	1228	1207	1258	1976	1453	11716

and the Sulphur mine field in Calcasieu Parish were the new fields in this area for 1926. Starks field in Calcasieu Parish and Kelso Bayou field in Cameron Parish were added to the producing list in 1927. The early part of 1928 witnessed the addition of two more producing fields in the costal area, the Sorrento field in Ascension Parish, and Bayou Bouillon in St. Martin Parish.

In South Louisiana the period covered in this report was marked by a tremendous increase in activity in geophysical prospecting. Many new salt domes discovered by these modern methods have been reported. To meet the general demand for information on this campaign, the Minerals Division issued in April, 1927, a map showing the publicly known salt domes as of that

Tabl No. II

**ANNUAL REPORT OF MINERALS DIVISION SHOWING, BY PARISHES,
NUMBER OF PERMITS ISSUED DURING 1926**

PARISH	Drill	Deepen	Abandon	Perforate	Temporary Abandon	Side Track	Work Over	Miscellan- eous	TOTAL
Acadia -----	19	8	7	0	0	6	6	0	46
Assumption -----	1	0	1	0	0	0	0	0	2
Beauregard -----	1	0	1	0	0	0	0	0	2
Bienville -----	2	0	1	0	0	0	0	0	3
Bossier -----	48	22	32	0	0	0	0	0	102
Caddo -----	283	13	122	14	0	0	1	2	435
Calcasieu -----	81	13	33	1	5	2	8	0	143
Caldwell -----	9	0	5	0	0	0	0	0	14
Cameron -----	12	0	5	0	0	0	0	0	17
Catahoula -----	5	0	1	0	1	0	0	0	7
Claiborne -----	12	13	52	0	1	0	0	0	78
De Soto -----	18	1	24	0	0	0	0	0	43
Evangeline -----	3	0	3	0	0	0	0	0	6
East Carroll -----	3	0	2	0	0	0	0	0	5
East Feliciana -----	1	0	0	0	0	0	0	0	1
Franklin -----	7	0	2	0	0	0	0	0	9
Grant -----	45	0	16	0	2	0	0	0	63
Iberia -----	6	0	1	0	0	0	0	0	7
Jackson -----	9	0	1	0	0	0	0	0	10
Jefferson Davis -----	16	0	6	0	0	0	0	0	22
Lafourche -----	1	0	1	0	0	0	0	0	2
LaSalle -----	466	2	78	0	3	0	0	0	549
Lincoln -----	5	0	5	0	0	0	0	0	10
Morehouse -----	19	0	4	0	0	0	0	0	23
Madison -----	1	0	0	0	0	0	0	0	1
Natchitoches -----	23	0	11	0	0	0	0	0	34
Ouachita -----	63	0	3	0	0	0	0	0	66
Rapides -----	3	0	1	0	0	0	0	0	4
Red River -----	10	3	55	0	1	0	0	0	69
Richland -----	11	0	2	0	0	0	0	0	13
Sabine -----	11	1	7	0	0	0	0	0	19
St. Landry -----	1	0	0	0	0	0	0	0	1
St. Martin -----	9	1	10	0	0	0	0	0	20
St. Mary -----	11	0	11	0	0	0	0	0	22
Terrebonne -----	4	0	0	0	0	0	0	0	4
Tensas -----	1	0	0	0	0	0	0	0	1
Union -----	17	1	4	0	0	0	0	0	22
Webster -----	33	3	14	0	0	0	0	0	50
Winn -----	40	1	8	0	1	0	0	0	50
West Feliciana -----	1	0	0	0	0	0	0	0	1
Totals -----	1311	82	529	15	14	8	15	2	1976

Total for year 1925-----1258

Total for year 1924-----1207

Increase 1925 over 1924_ 51

Total for year 1926-----1976

Total for year 1925-----1258

Increase 1926 over 1925_ 718

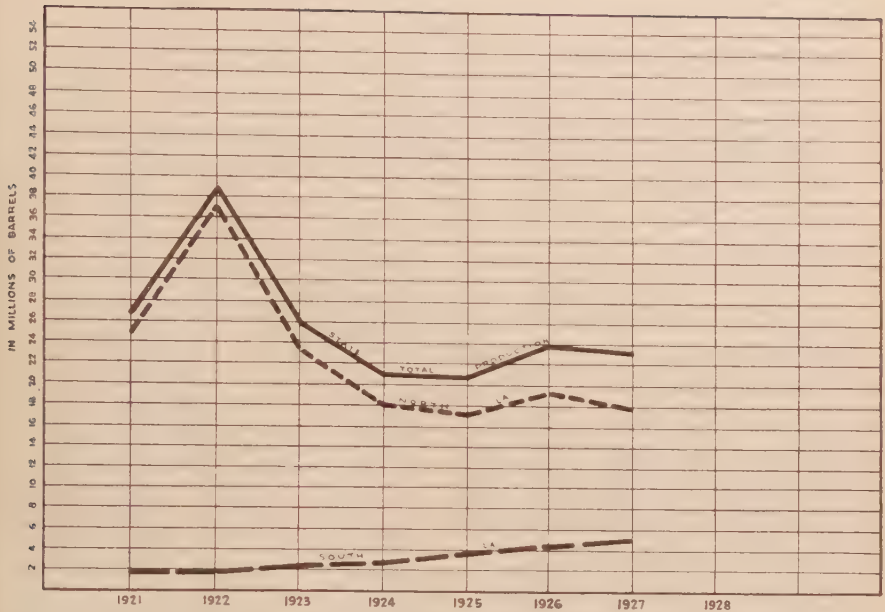


Figure 5—OIL PRODUCTION CURVE
South Louisiana, North Louisiana and State Total

date. Many more domes have been reported but the Minerals Division lacks information definite enough to warrant placing them on the map. Domes are reported to have been found in Terrebonne Parish, Timbalier Bay, West Cote Blanche Bay, Vermilion Bay, Sabine Lake and numerous other points throughout the lower half of the state. No definite information is yet available on these reported discoveries.

1926 brought no new oil fields for North Louisiana except some minor extensions. 1926, however, saw the Tullos-Urania peak production, and the extension of the field from La Salle into Grant and Winn Parishes. In November, 1926, Haynesville's one deep producer was completed at a total depth of 5,092 feet, and plugged back to 4,530 feet. The well has held up a steady production of 30 barrels per day ever since. The production is from the Trinity horizon.

1927 added one new oil producing area, the Pleasant Hill Feld, Sabine Parish. The same year brought

the Pine Island revival through the discovery of new deeper oil production.

Table No. III
ANNUAL REPORT OF MINERALS DIVISION SHOWING, BY PARISHES,
NUMBER OF PERMITS ISSUED DURING 1927

PARISH	Drill	Deepen	Abandon	Perforate	Temporary Abandon	Side Track	Work Over	Miscellan- eous	TOTAL
Acadia -----	19	2	9	0	0	8	3	1	42
Ascension -----	3	0	3	0	0	0	0	0	6
Assumption -----	3	0	3	0	0	0	0	0	6
Bienville -----	6	0	2	0	0	0	0	0	8
Bossier -----	61	6	22	0	1	0	0	0	90
Caddo -----	237	15	149	12	9	0	4	2	428
Calcasieu -----	63	22	20	3	6	2	4	0	120
Cameron -----	20	0	17	0	0	0	0	0	37
Catahoula -----	3	0	0	1	1	0	0	0	5
Caldwell -----	9	0	7	0	0	0	0	0	16
Claiborne -----	7	10	70	0	0	0	0	0	87
De Soto -----	21	0	14	0	0	0	1	1	37
Evangeline -----	1	0	2	0	0	0	0	0	3
East Carroll -----	1	0	1	0	0	0	0	0	2
Franklin -----	6	0	5	0	0	0	0	0	11
Grant -----	20	0	20	0	0	0	0	0	40
Iberia -----	7	1	6	0	0	0	0	0	14
Iberville -----	4	0	0	0	0	0	0	0	4
Jackson -----	1	0	2	0	0	0	0	0	3
Jefferson Davis -----	3	0	6	0	0	0	0	0	9
La Fourche -----	2	0	1	0	0	0	0	0	3
LaSalle -----	45	0	22	0	2	0	0	0	69
Madison -----	0	1	0	0	0	0	0	0	1
Morehouse -----	19	1	10	0	0	0	1	0	30
Natchitoches -----	15	0	13	0	1	0	0	0	29
Ouachita -----	35	0	3	0	0	0	0	0	38
Rapides -----	3	0	2	0	0	0	0	0	5
Richland -----	54	0	8	0	0	0	0	0	62
Red River -----	12	0	38	0	0	0	1	0	51
Sabine -----	42	0	8	0	1	0	0	0	51
St. Mary -----	4	0	4	0	0	0	0	0	8
St. Martin -----	3	0	3	1	0	0	0	0	7
Terrebonne -----	4	1	13	0	0	0	0	0	18
Union -----	16	0	4	0	0	0	0	0	20
Vernon -----	1	0	1	0	0	0	0	0	2
Webster -----	39	5	19	0	0	0	0	0	63
Winn -----	16	0	7	0	0	0	0	0	23
West Carroll -----	3	0	0	0	0	0	0	0	3
Totals -----	808	64	514	17	22	10	14	4	1453

Total for year 1926-----1976

Total for year 1927-----1453

Decrease 1927 from 1926- 523

The early part of 1928 is marked by opening of a new and deeper Trinity horizon in Cotton Valley. Only one oil well has been completed at this writing, Ohio Oil Company's No. 38 Bodcau. This well has been estimated as capable of making 3,000 barrels of oil and 15 million cubic feet of gas from a depth of 4,683 feet.

Total oil production for the state had reached 380,189,754 barrels by the end of 1927 (see Table V). Of this total, North Louisiana is responsible for 296,494,044 barrels, and South Louisiana produced 83,695,710 barrels. North Louisiana experienced its highest peak in 1922 when a total annual production of 34,904,901 barrels was noted. From 1924 to 1925 production fell steadily. 1926 recorded a slight recovery. This increase was due to the flush production from the Tullos-Urania Field which, during 1926, amounted to 4,178,672 barrels. All other fields, except Caddo, declined during 1926. Caddo showed a slight increase,—less than half a million barrels. In 1927, Red River, De Soto, Elm Grove, and Grant Parish, showed slight gains. Caddo's increase, due largely to the flush production from the deep Pine Island horizons, amounted to over a million barrels. Red River showed an increase of a few thousand barrels. Sabine Parish entered the list of producers with 226,700 barrels for its first year. All these gains were more than offset by declines in all other fields and North Louisiana showed a net decline for the year. South Louisiana's production has been climbing steadily for years. Active geophysical prospecting gives further promise of new fields. Figure 5, Oil Production Curves, presents crude oil production of the state from 1921 to 1927 in graphic form.

Louisiana, in comparison with other leading oil producing states, is merely holdnig her own. California has been leading for years, with Oklahoma, Texas, Arkansas, Wyoming, and Kansas all producing more oil than Louisiana. In 1922 Louisiana held fourth place in oil production. In 1923 the state dropped to seventh place which it has held since. Table VI shows the annual production of the ten leading oil states from 1923 to 1926.

Table No. IV
OIL PRODUCTION SOUTH LOUISIANA FIELDS
(In Barrels)

	1920*	1921	1922	1923	1924	1925	1926	1927	Total
Acadia Parish:									
Jennings Field---	41,274,467	187,536	156,600	149,378	142,406	271,375	385,417	343,376	42,910,555
Calcasieu Parish:									
Edgerly Field----	5,457,384	219,400	150,200	125,480	159,444	179,506	214,775	407,598	6,913,787
Vinton Field----	15,462,321	1,256,600	1,495,800	1,943,230	1,930,621	2,409,930	2,215,270	1,811,139	28,524,911
Lockport Field----	-----	-----	-----	-----	115,629	472,198	1,305,547	2,026,261	3,919,635
Starks Field----	-----	-----	-----	-----	-----	-----	-----	264,113	264,113
Sulphur Mine----	-----	-----	-----	-----	-----	-----	2,064	29,506	31,570
Cameron Parish:									
Hackberry or									
Kelso Bayou Field----	-----	-----	-----	-----	-----	-----	-----	42,925	42,925
Sweet Lake Field----	-----	-----	-----	-----	-----	-----	10,755	76,465	87,220
Iberia Parish:									
Fausse Pointe or									
Loreauville Field----	-----	-----	-----	-----	-----	-----	10,926	16,787	27,713
Jefferson Davis Parish:									
Welsh Field----	354,776	-----	-----	-----	1,309	7,432	14,708	10,190	388,415
St. Martin Parish:									
Anse La Butte									
Field -----	466,484	45,000	34,000	16,000	10,000	6,090	3,355	4,827	584,866
Total -----	63,015,432	1,708,536	1,836,600	2,234,088	2,359,409	3,346,441	4,162,817	5,032,387	83,695,710

*—Prior to and including 1920.

Table No. V
OIL PRODUCTION NORTH LOUISIANA FIELDS
(In Barrels)

	1920*	1921	1922	1923	1924	1925	1926	1927	Total
Bossier Parish:									
Bellevue Field---	---	---	1,479,905	2,250,057	1,745,980	1,171,358	829,394	476,231	7,952,925
Elm Grove Field---	---	---	290,721	473,730	283,554	240,177	232,917	245,790	1,766,889
Caddo Parish:									
All subdivisions--	82,085,848	5,391,166	4,231,555	3,998,593	4,251,319	4,087,673	4,669,421	5,703,434	114,419,009
Claiborne Parish:									
Haynesville Field---	---	2,964,972	20,299,911	10,905,194	6,160,607	4,771,337	3,439,064	2,631,817	51,172,902
Homer Field---	24,177,001	12,736,884	6,293,809	3,801,938	2,891,580	2,345,000	2,105,255	1,751,989	56,103,456
De Soto Parish:	12,608,300	719,000	531,000	429,000	353,000	431,000	427,850	444,450	15,943,600
Grant Parish:									
Urania Field---	---	---	---	---	---	---	3,800	56,956	60,765
La Salle Parish:									
Urania Field---	---	---	---	---	---	16,708	1,049,444	3,556,276	7,622,428
Winn Parish:									
Urania Field---	---	---	---	---	---	---	125,128	108,810	234,238
Red River Parish--	21,494,340	2,844,000	1,778,000	1,560,665	1,231,000	937,000	912,920	945,730	31,703,655
Sabine Parish:									
Pleasant Hill Field---	---	---	---	---	---	---	---	226,700	226,700
Webster Parish:									
Cotton Valley Field---	---	---	---	---	1,176,011	3,337,060	2,787,744	1,986,669	9,287,484
Total North La.----	140,365,489	24,656,022	34,904,901	23,419,177	18,093,051	17,337,313	19,583,237	18,134,852	296,494,044
Total South La.----	63,015,432	1,708,536	1,836,600	2,234,088	2,359,409	3,346,441	4,162,819	5,032,387	83,695,710
Total for State----	203,380,921	26,364,558	36,741,501	25,653,265	20,452,460	20,683,754	23,746,056	23,167,239	380,189,754

*--Prior to and including 1920.

CADDO FIELD

The Caddo oil and gas field, a group of separate pools, extends roughly from T 20 N to T 22 N and from R 14 W to R 16 W, extending across the state line into Marion County, Texas, for a very short distance opposite T 20 N and T 21 N. Except for the slight projection into Marion County, the group of fields lies entirely in Caddo Parish. The field is on the northern end of the Sabine Uplift and the producing horizons of the Upper Cretaceous have a structural relief of about 200 feet.

Caddo produced Louisiana's first natural gas. This gas came from the Nacatoch horizon about 800 to 1000 feet below the surface. At the present time a small amount of oil and gas is produced from the Nacatoch. Considerable oil is produced from the Annona Chalk, 1400 to 1700 feet deep. The "Chalk Rock" production is mainly confined to the Pine Island district of the Caddo Field. The Woodbine sand at the base of the Upper Cretaceous has been an important producer of oil throughout the Caddo Field. Lower Cretaceous production is obtained in the Caddo Field at various levels in the Trinity horizon. This production is confined to Pine Island, where the Woodbine rests unconformably on the Glen Rose of the Trinity with approximately 1350 feet of the upper part of the Lower Cretaceous section missing.

Pine Island furnished the most spectacular development in 1927. The Trinity production, mainly from 3650 to 3900 feet in depth, assumed such proportions in 1926 and 1927 that the normal decline of the field was checked. Unfortunately, in the wild scramble for the oil, the gas head was rapidly exhausted, and water encroachment checked what promised to be very heavy production. This matter is further discussed under "Laws and Regulations". Caddo had produced, up to the end of 1927, 114,419,009 barrels of oil, nearly one half of North Louisiana's oil production. Commercial gas was discovered in Caddo in 1907. Oil was dis-

Table No VI
TEN LEADING OIL PRODUCING STATES OF THE UNITED STATES
(In Barrels)

State—	1923	1924	1925	1926
California -----	262,876,000	228,933,000	232,492,000	224,673,000
Oklahoma -----	160,929,000	173,538,000	176,768,000	179,195,000
Texas -----	131,023,000	134,522,000	144,648,000	166,916,000
Arkansas -----	36,610,000	46,028,000	77,398,000	58,332,000
Wyoming -----	44,785,000	39,498,000	29,173,000	25,776,000
Kansas -----	28,250,000	28,836,000	38,357,000	41,498,000
LOUISIANA -----	25,653,000	20,452,000	20,684,000	23,746,000
Illinois -----	8,707,000	8,081,000	7,863,000	7,760,000
Pennsylvania -----	7,609,000	7,486,000	8,097,000	8,961,000
Kentucky -----	8,069,000	7,407,000	6,759,000	-----
Montana -----	-----	-----	-----	7,727,000

covered in 1906. 1918 saw Caddo's peak oil production of almost 11,000,000 barrels for the year.

BELLEVUE FIELD

The Bellevue Field lies entirely in T 19 N, R 11 W, Bossier Parish. It is the shallowest oil field in the state and lies on the northeastern edge of the Sabine Uplift. Production is secured from the Nacatoch sand about 400 feet from the surface. The structure has a relief of over 500 feet on top of the Sabine Uplift, forming a very high truncated dome on a nose extending eastward from the main uplift. On its eastern side, away from the Sabine uplift, the Bellevue structure drops 1800 feet in six miles. No production has been found in any but the Nacatoch sand. Prospecting of the deeper sands is still under way. The discovery well was completed in November, 1921, at a depth of 396 feet and had an estimated initial flow of 6000 barrels of oil. Many of the wells were drilled with light portable rigs. The field is now declining steadily after reaching its peak of 2¼ million barrels in 1923. In 1927 the field produced 476,231 barrels. Total production to the end of 1927 amounted to 7,952,925 barrels.

ELM GROVE FIELD

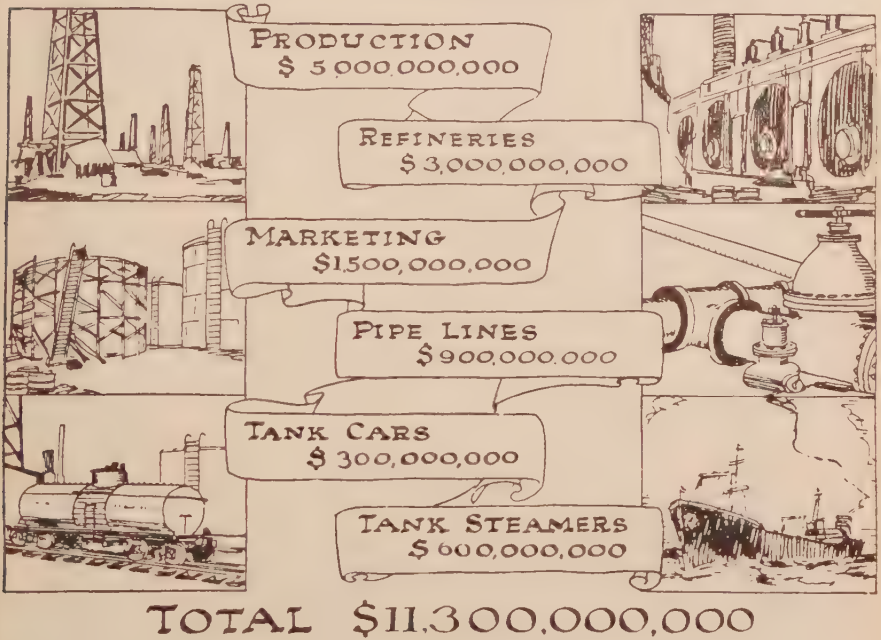
Elm Grove lies in Caddo and Bossier Parishes, in T 16 N, R 11 and 12 W, about 20 miles southeast of Shreveport. Oil production is confined to one sand in a small area near the center of the field. Though the production has never been very great, and the wells are only small pumpers, enough encouragement is given operators to continue the drilling of a few more wells each year. Peak production was reached in 1923 and amounted to 473,730 barrels. In 1927 the field produced 245,790 barrels, making a total production to the end of 1927 of 1,766,889 barrels. The oil is produced from a sand horizon lying immediately beneath the Annona Chalk. The sand is probably a member of the Brownstown Marl. One deep well in the old Elm Grove Field, Gulf Refining Company's No. 11 Hodges, drilled in 1922, made an extremely good showing of oil at 4437 feet, probably from the Trinity. The well went to salt water and was abandoned. In the Sligo extension to the north of the Elm Grove Field, Sligo Syndicate's No. 1 Jeter was completed in August, 1927, at 4,209 feet with an estimated initial production of 2 million cubic feet of gas and 25 barrels of oil. There is still a very reasonable hope of deep oil in the Elm Grove area.

HAYNESVILLE FIELD

The Haynesville Field lies almost entirely in T 23 N, R 8 W, Claiborne Parish. A very small extension of its western boundary carries it slightly over the Webster Parish line in T 23 N, R 9 W. The field covers close to 7,000 acres. It lies off the eastern edge of the Sabine Uplift and is about 900 feet lower structurally than the Homer Field to the south. The first productive oil well was drilled in March, 1921. Production is from the Blossom Sand at about 2850 feet. Development in the Haynesville Field was carried on without the costly line fights which have marked the early days of most oil fields. Through the efforts of the Department of Conservation, operators, early in the life of the field,

FIGURE 3.

INVESTMENT IN PETROLEUM INDUSTRY



From: The Oil and Gas Journal

agreed to drill no closer than 330 feet from property lines. This agreement practically limited drilling to one well to ten acres and is largely responsible for the good condition of the field today. In 1922 the department published, in cooperation with the Bureau of Mines, its Bulletin No. 11, on the Haynesville Field. This bulletin is now out of print.

In 1926, Ramsey Bros., drilled No. D-1 G. W. Taylor in Section 14, T 23 N, R 8 W. This well, the first deep test favorably located on the Haynesville structure, encountered a gas sand in the upper Trinity from 4328 to 4330 feet. The sand tested about 4 million cubic feet of gas with a rock pressure of 1250 pounds. The gas showed 450 gallons of gasoline per million cubic

feet. Twelve feet of sand at 4,530 feet yielded on test about 30 barrels of 36 gravity oil and practically no gas. The well was deepened to 5,074 feet without further showing. It was plugged back to 4,530 feet and put on the pump on April 1, 1927. Pumping yielded 75 barrels for the first day. This production soon dropped to 30 barrels per day. The well has produced from 25 to 30 barrels per day since. It is understood that negotiations are now under way for the drilling of two more deep tests for the field.

Haynesville produced almost 3 million barrels in its first year, 1921. In 1922 it reached its peak of 20,299,911 barrels. Since that time it has declined steadily. In 1927, it produced 2,631,817 barrels. Total production to the end of 1927 amounted to 51,172,902 barrels.

HOMER FIELD

The Homer Field lies in T 21 N, T 7 and 8 W, Claiborne Parish. The field is traversed by a fault with a probable throw of 250 feet. North of the fault, on the upthrow side, production is obtained from the Nacatoch. South of the fault, on the downthrow side, production is obtained from both the Nacatoch and Blossom Sands. The structure lies east of the Sabine Uplift and south of the Haynesville Field.

The first producing well in the field was completed in May, 1919, at a depth of 1416 feet, in the Nacatoch Sand. Homer reached its peak in 1920 with a production for the year of 22,182,836 barrels. Production is steadily declining. In 1927 it dropped to 1,751,989 barrels. Total production to the end of 1927 amounted to 56,103,456 barrels.

DE SOTO-RED RIVER FIELDS

The De Soto-Red River Fields comprise a group of oil and gas pools lying between Mansfield and Coushatta in T 12 and 13 N, R 10, 11 and 12 W, in De Soto and Red River Parishes. Gas was discovered in 1912 in

Table No VII
AVERAGE OIL PRICES, 1924-1925-1926-1927
LOUISIANA FIELDS

	Gravity	1924	Price per Barrel			Feb. 21
			1925	1926	1927	1928
North Louisiana:						
Caddo	38+	\$ 1.56	\$ 1.97	\$ 2.22	\$ 1.73	\$ 1.55
Caddo	35-37.9	1.46	1.87	2.13	1.47	1.28
Caddo	32-34.9	1.36	1.77	2.00	1.37	1.19
Caddo	29-31.9	1.21	1.64	1.82	1.29	1.06
Caddo	26-28.9	---	---	1.47	1.22	.96
Caddo	26—	---	---	1.40	1.18	.91
Homer	35+	1.49	1.74	2.03	1.48	1.26
Homer	33-34.9	1.39	1.64	1.93	1.41	1.20
Homer	31-32.9	1.29	1.54	1.83	1.33	1.13
Homer	31—	1.14	1.39	1.70	1.30	1.09
Haynesville	33+	1.39	1.64	1.97	1.38	1.19
Haynesville	33—	1.29	1.54	1.88	1.33	1.15
Bull Bayou	38+	1.47	1.77	2.08	1.53	1.34
Bull Bayou	35-37.9	1.32	1.62	1.95	1.47	1.28
Bull Bayou	32-34.9	1.17	1.47	1.80	1.38	1.19
Chrichton	33-34.9	1.32	1.62	1.97	1.37	1.20
Bellevue	19-20	1.42	1.74	1.52	1.25	1.25
DeSoto	-----	1.52	1.82	2.18	1.44	1.31
Sabine	41	---	---	---	1.60	1.43
Cotton Valley	-----	.88	1.09	1.15	.98	.75
Urania	20.0-22.0	---	---	1.28	.94	.75
South Louisiana:						
Gulf Coast Heavy:						
Grade A	26—	1.61	1.66	1.52	1.30	1.20
Grade B	-----	---	---	1.38	1.27	1.15
Gulf Coast Light	29-29.9	---	---	1.70	1.43	1.25
Gulf Coast Light	28-28.9	---	---	1.65	1.40	1.23
Gulf Coast Light	27-27.9	---	---	1.60	1.37	1.21
Gulf Coast Light	26-26.9	---	---	1.55	1.33	1.19
Gulf Coast Light	25-25.9	---	---	1.50	1.30	1.17
Gulf Coast Light	25—	---	---	1.35	1.27	1.15

De Soto Parish near Naborton. Oil was discovered in Gulf Refining Company's No. 2 Jenkins in De Soto Parish in 1913. Red River's first oily well, No. 1 Marston, was completed in 1914 near Abington. The Chrichton Field, another of the group, was brought in as a major producing area early in 1915.

In the De Soto-Red River group the Nacatoch Sand

production is confined to gas. Occasional shows of oil have been noted in the Annona Chalk. The principal oil production comes from a series of sands usually called the Woodbine. Recently, several deep tests have been carried well into the Trinity horizon, but no favorable results have been obtained.

Peak production was reached in this area in 1915 with a total of 9,372,910 barrels. The field fell off to slightly over 2 million in 1918, and increased to almost 6 million in 1920. Since 1920 the field has slowly declined. In 1927 production amounted to 1,390,180 barrels. Total production to the end of 1927 amounted to 47,647,255 barrels.

Some very interesting experiments in repressuring the oil sands have been carried on in this area by the Gulf Refining Company and The Texas Company. On one lease the sand was repressured to 85 pounds and resulted in a 100% recovery of the gas used, a 100% increase in oil recovery, and additional returns from gasoline stripped from the recovered gas. The effect of repressuring is worthy of further study in many of the older fields in the northern part of the state.

TULLOS-URANIA FIELDS

This group includes the fields near Tullos, Urania, Rochelle, and Georgetown in LaSalle, Grant, and Winn Parishes. The group lies in T 10 N, R 1 and 2 E, and in T 9 N, R 1 E. The greater part of the production is secured in LaSalle Parish. The oil is obtained from a sand at the contact between the Cane River, or lowest member of the Claiborne Group, and the Wilcox formation. This so-called Cane River Sand is the youngest horizon yielding commercial production in North Louisiana. In the White Sulphur Springs area, lying to the southeast of the field, excellent showings of oil were reported during 1927. These oil shows were probably at the base of the Jackson formation. No commercial production has been obtained from this horizon as yet.

The Tullos Urania Field was discovered in March, 1925. The first wells produced large amounts of gas

and several of them were lost before commercial production was developed. The early life of the field was marked by hasty and careless drilling and production, and reckless promotion. The production was confined to LaSalle Parish in 1925 and totalled 16,708 barrels. In 1926 Grant Parish produced 3,800 barrels, Winn Parish 125,428 barrels, and LaSalle Parish 4,049,444 barrels, a total of 4,178,672 barrels. This was the peak year. Production amounted to 3,722,042 barrels in 1927. Total production reached 7,917,422 barrels by the end of 1927.

COTTON VALLEY FIELD

The Cotton Valley Field in T 21 N, R 10 W, Webster Parish was discovered in 1924. Production of oil was confined to the Blossom Sand until late in March, 1928, when the Ohio Oil Company's No. 38 Bodcau came in as a large producer at a depth of 4,683 feet. This deep production is from the Trinity. The Blossom Sand production reached its peak in 1925 with 3,337,060 barrels. The production from this sand is now declining steadily. In 1927 it dropped to 1,986,669 barrels. Total production to the end of 1927 amounted to 9,287,484 barrels.

The deep production looks very promising. Whether its real promise will ever be fulfilled is questionable. Should the operators follow the same methods that characterized deep prospecting in the Pine Island area, the future history of the field can be written now. Undoubtedly the Cotton Valley deep production will pay out in handsome returns provided that the operators carefully conserve the gas now in the sand. If this gas head is blown off in a wild scramble for flush production, if the water encroachment is not fought consistently by the maintenance of the highest possible working pressure on all wells in the field, the hope of handsome returns will be dissipated with the gas. The operators have been called together by the Minerals Division, and seem to be united in favor of gas conservation. It is earnestly hoped that cooperative agreement among

the operators may produce favorable results. A committee of operators has been appointed to consider all possible means of safeguarding the field, particularly in regard to producing through tubing and limiting drilling to one well to each 40 acres.

Undoubtedly the Blossom Sand production in the Cotton Valley area was greatly reduced by unwise production methods. Gas was recklessly blown into the air in the vain hope of increasing the oil yield. So rapidly was the gas blown off that one gas line laid into the field to take out gas had to be used, within a year after its construction, to pipe gas back into the field for drilling purposes.

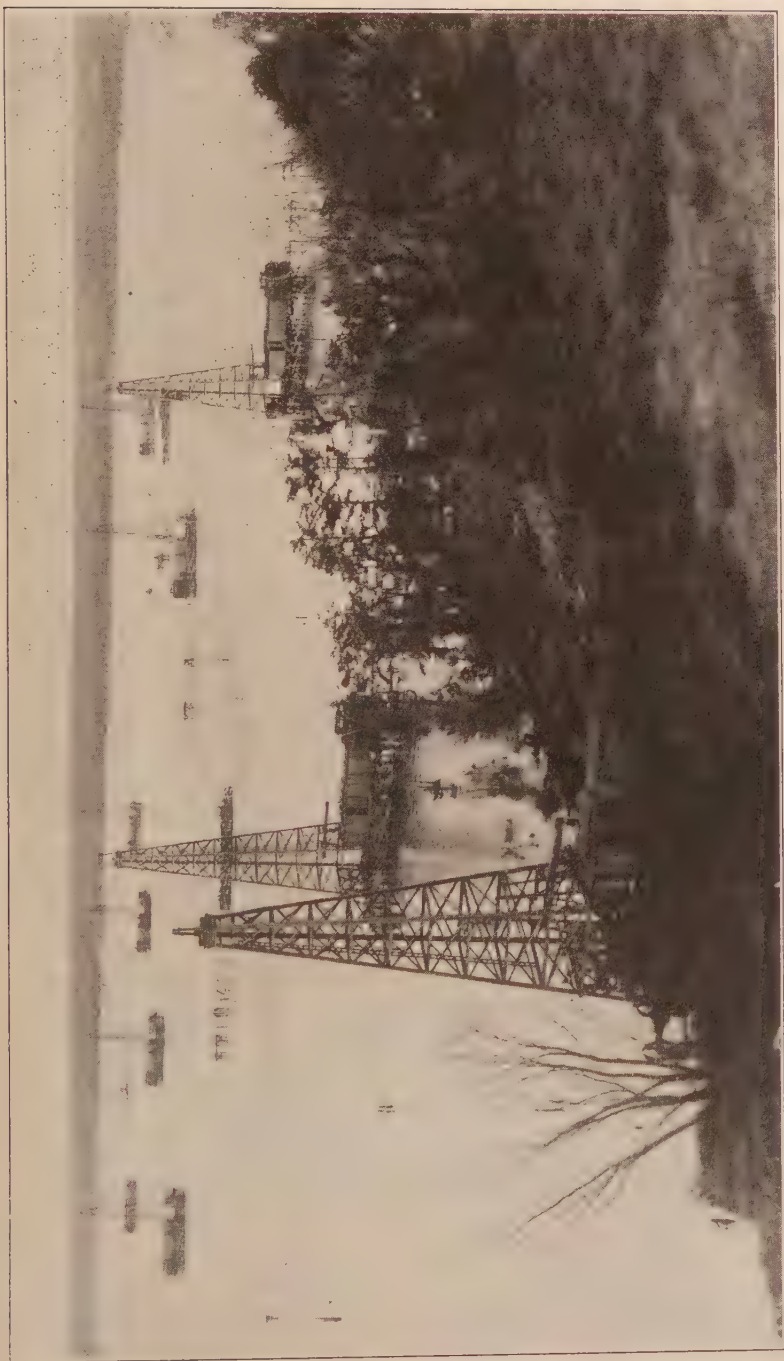
PLEASANT HILL FIELD

The Pleasant Hill Field was brought in during April, 1927. The field is at present confined to three sections in the southwestern part of T 10 N, R 12 W and section 5, T 9 N, R 12 W, in Sabine Parish. Production in 1927 amounted to 226,700 barrels. Production is obtained from a sand that is probably included in upper portion of the Washita

JENNINGS FIELD

The Jennings Field is located in Acadia Parish, 185 miles west of New Orleans, and 35 miles east of Lake Charles, near the center of T 9 S, R 2 W. The field is one of the oldest of the major producing areas of the Gulf Coast. Gas seepages noted in springs led to the drilling of a test well in 1901. The well blew in, during August of that year, from a depth of 1882 feet, went wild, choked up, and was abandoned. A second test was too far south and was abandoned without result. A third test came in before screen was set and was lost. Extensive drilling soon followed, but it was not until June, 1902, that the first commercial producer was completed.

The story of the early days of Jennings Field reads much like the story of some fields of the present day.



(Photo by Grabill)

OIL WELLS IN CADDO LAKE, NEAR SHREVEPORT

Reckless drilling soon dissipated the gas head and wells were put on the pump. The blight of overproduction, so potent a factor in the fields of today, discouraged the Jennings operators in 1905. During that year, the great Humble Oil Field in Texas produced so heavily that Jennings oil was forced down to 16 cents a barrel. The peak year was in 1906 during which production amounted to over 9 million barrels. In 1924 production had dropped to 142,406 barrels. Since that time it has gone up steadily until in 1926 the total for the year reached 385,417 barrels. 1927 showed a slight decrease, to 343,376 barrels. Total production to the end of 1927 amounted to 42,910,555 barrels.

EDGERLY FIELD

The Edgerly Field is located midway between Beaumont, Texas, and Lake Charles, Louisiana, in Sections 28 and 29, T 9 S, R 11 W, Calcasieu Parish. Gas seepages were noted in this area as early as 1906. These surface showings were particularly noticeable in the marsh near the northeast corner of Section 28. The first well was put down in September 1907. The well was drilled into salt water at 1820 feet. It was then perforated at 1560 and blew out making considerable dry gas and sand. It was abandoned. A second test was drilled into salt water at 2025 feet. A third test was abandoned at 1980 feet without result. Several more failures followed. The first producing well was drilled in 1912, making 250 barrels of 17.5° Beaume oil at 1500 feet. The field netted 407,598 barrels in 1927 and has to its credit a total production of 6,913,787 barrels up to the end of 1927. Recent deeper drilling has given the field a marked increase in production.

VINTON FIELD

The Vinton, or Ged, Field is located between Vinton and Ged in the southern end of T 10 S, R 12 W, Calcasieu Parish. The possibility of oil production in the Vinton area was recognized as early as 1902. Up to



BLACK GOLD
A Louisiana oil gusher "comes in"

Table XIV
SUMMARY OF DRILLING OPERATIONS
in Proved and Prospective Fields in the
GULF COAST AREA SOUTH LOUISIANA
(March 15, 1928)

Name of Field or District	Parish	Year of Discovery	No. Producing Wells Comp.	No. Dry Holes Comp.	No. Present Wells Prod.	Daily Production	Total Prod. to Jan. 1, 1928, (Barrels)
Anse la Butte	St. Martin	1902	16	102	3	45	585,000
Avery Island	Iberia			5			
Batiste Bay	Plaquemine						
Belle Island	St. Mary			30			
Bayou Blue	Iberville			1			
Bayou Bouillon	St. Martin, Iberville	1902	1	24	1	1,000+	(Comp. 1928)
Calcasieu Lake	Cameron						
Caillou Bayou	Terrebonne			2			
Chacahoula or Lutcher	La Fourche						
Choctaw Bayou or Grosse Tete	Iberville						
Cote Blanche	St. Mary			38			
Darrow	Ascension						
Des Glaise	Iberville			1			
Edgerly	Calcasieu	1907	160	51	39	1,255	7,060,000
Egan	Acadia						

Fausse Pointe	Iberia	1926	3	5	---	---	27,713
Grand Lake (Eugene)	St. Martin	---	---	---	---	---	---
Gum Cove	Cameron	---	---	1	---	---	---
Hackberry	Cameron	---	---	59	---	---	---
El, Hackberry or Kelso Bayou	Cameron	1927	4	2	4	1,640	42,925
Jefferson Island	Iberia	---	---	35	---	---	---
Jennings	Acadia	1901	504	141	73	970	42,910,000
Johnson Bayou	Cameron	---	---	7	---	---	---
Lockport	Calcasteu	1924	35	15	29	4,385	3,920,000
Mongoulis	St. Martin	---	---	---	---	---	---
New Iberia	Iberia	1917	3	16	1	5	70,000
Napoleonville or Paincourtville	Assumption	1926	---	4	---	---	---
Pine Prairie	Evangeline	1912	3	21	---	---	20,000
Port Barre or Chaisson	St. Landry	---	---	---	---	---	---
Raccourci	La Fourche	---	---	---	---	---	---
Sec. 28 (Ohio)	St. Martin	---	---	5	---	---	---
Slidell	St. Tammany	---	---	---	---	---	---
Sorrento or McElroy	Ascension	1927	1	6	1	800	(Comp. 1928)
Starks	Calcasteu	1925	3	15	3	220	264,113
*Sulphur	Calcasteu	1926	2	3	1	180	31,570
†Sweet Lake	Cameron	---	5	2	3	1,525	87,220
§Terrebonne (Gas)	Terrebonne	---	8	12	---	None	---
Terrebonne Bay	Terrebonne	---	---	---	---	---	---
Vermilion Bay	Iberia	---	---	1	---	---	---
Vinton (Ged)	Calcasteu	1902	385	148	138	4,825	28,525,000
Weeks Island	Iberia	---	---	---	---	---	---

†Welsh	Jefferson	Davis	1901	36	26	18	35	388,415
White Castle	Iberville				1			
Woodlawn	Jefferson	Davis						
Total—44			1,169	778	314	16,886		83,931,956

*—Union Sulphur Co. drilled 716 wells for sulphur prior to 1927.

†—First oil discovered 1926 and 2 of these 5. completions were gas wells.

‡—The Terrebonne Gas Field metered 5,380,000,000 cu. ft. of gas to January 1, 1928. First gas well completed in 1904, but it was 1918 before commercial quantities were discovered.

†—One company has 15 wells out of the 18 and they are shut down. Estimated these 15 wells will make from 1,200 to 1,500 barrels per day if they were pumping, only leaves 2 wells making above 35 barrels per day.

SUMMARY

	Total Prod. Barrels	Average Per Acre Barrels
Edgerly Field covers approximately--210 acres	7,060,000	33,619
Jennings Field " " --320 acres	42,910,000	134,093
Vinton (Ged) " " --250 acres	28,525,000	114,100
Lockport Field " " --120 acres	3,920,000	32,666
Welsh Field " " --100 acres	388,000	3,880
Total number producers drilled on all domes-----	1,169	
Total Number dry holes drilled on all domes-----	778	
Total wells drilled-----	1,944	

There are 314 wells of the 1,169 producers that are still producing oil.

Some of the fields noted in this table are not shown on the Mini-rails Division Salt Dome Map, published in April, 1927, because some of them are merely prospective areas and are not yet accepted as salt dome structures. Others are probable domes but no definite information or exact location is available.

1910 no well was drilled deeper than 1100 feet. A small quantity of very heavy oil was obtained in 1907 by means of hand pumps in shallow wells. No wells of any importance were brought in until 1911. Fifty-four wells were completed in that year. Peak production was reached in 1925 with 2,409,930 barrels. Production in 1927 amounted to 1,811,139 barrels, making a total production, up to the end of that year, of 28,524,911 barrels.

LOCKPORT FIELD

The Lockport Field, near the center of T 10 S. R 9 W, and near Lake Charles, in Calcasieu Parish, was discovered in 1924. The field produced 115,629 barrels during its first year, and reached its peak of 2, 026,261 barrels in 1927. Its history shows a steady increase in production. Up to the end of 1927 its total production amounted to 3,919,635 barrels.

STARKS FIELD

The Starks Field was discovered in 1927 as the result of geophysical exploration. It is located in the southwest corner of T 9 S, R 12 W. Production for the year amounted to 264,113 barrels.

SULPHUR MINE FIELD

The production at the Sulphur Mine near the southwest corner of T 9 S, R 11 W, came about as the result of exploration carried on by the Union Sulphur Company in their search for further sulphur deposits. The first oil was brought in during 1926 and amounted to 2064 barrels for the year. In 1927, the sulphur company produced 29,506 barrels. During the early part of 1928 new wells of great promise have been completed and the Sulphur Dome will probably become one of the major producing fields of the Coastal area.

KELSO BAYOU FIELD

The Kelso Bayou Field in Cameron Parish is located on the bayou of that name near its junction with Calcasieu Lake in T 12 S, R 9 and 10 W. One well is being drilled in the lake off the mouth of the bayou. The field

was discovered in 1927 during which year it produced 42,925 barrels. The successful completion of wells in this area comes as a climax to 20 years of exploration around the old Hackberry dome. Fifty-nine dry holes were completed in the area before oil was produced. The new field is one of great promise.

SWEET LAKE FIELD

The Sweet Lake Field was discovered in 1926 in T 13 S, R 8 W. It produced 10,775 barrels in 1926, and 76,465 barrels in 1927, making a total of 87,220 barrels. Sweet Lake is the deepest field in Louisiana. One well produces from 5,924 feet.

FAUSSE POINTE FIELD

The Fausse Pointe Field is located in Section 26, T 11 S, R 8 E, Iberia Parish. It was discovered in 1926 and gave considerable promise for a while. Three wells and five dry holes were completed, but at the present time none of the wells are producing. The field produced 10,926 barrels in 1926, and 16,787 barrels in 1927. Prospecting will be continued and 1928 may see a revival for the field.

WELSH FIELD

Gas seepage on the Woods farm in what is now the Welsh Field led to the drilling in 1901 of the first well in this area. Though the hole was ruined and abandoned at 1050 feet, the showing obtained warranted further drilling. In 1902 the second well blew out at 1000 feet. About 40 wells were drilled between 1901 and 1910. Since that time the total number of wells in the general area has reached 91. In the actual area of the field 61 wells have been drilled of which 26 were dry holes and 36 were producers. Eighteen wells are now producing. Peak production was attained in 1910 and amounted to 54,724 barrels for the year. Production fell off to practically nothing, and ceased altogether in 1917. 1918's production amounted to 4,540 barrels. No production is noted for 1921, 1922, and 1923. Production was revived with 1,309 barrels in 1924, and increased to 14,708 in 1926. It dropped in 1927 to 10,190

barrels. Total production to the end of 1927 amounted to 388,415 barrels. The field is located in Sections 21, 22, 27, and 28, T 9 S, R 5 W, about 3 miles west of the town of Welsh in Jefferson Davis Parish.

ANSE LA BUTTE

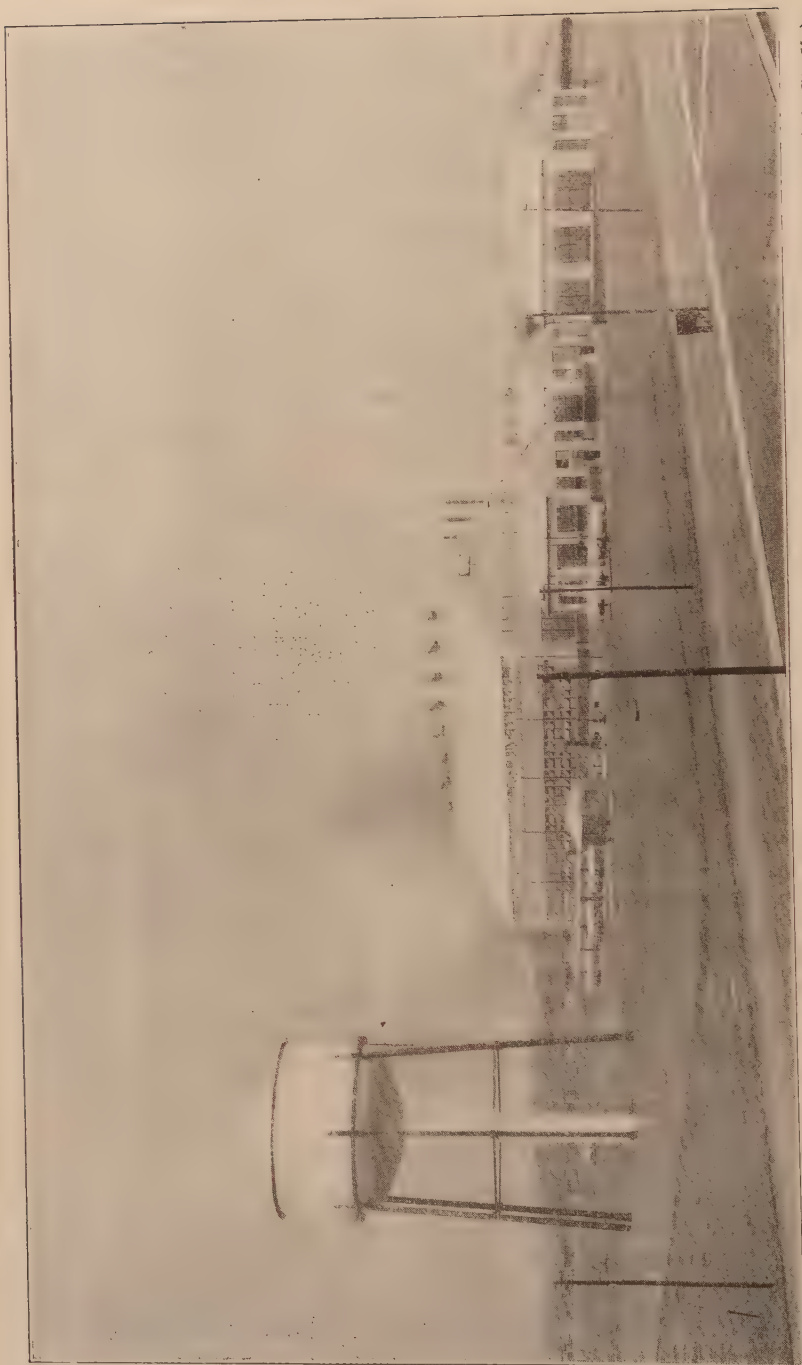
The Anse La Butte Field lies in the southeastern part of T 9 S, R 5 E, St. Martin Parish. The first producing well was completed in 1902. Peak production came in 1908 when the total for the year reached 219,265 barrels. The field produced 4,027 barrels in 1927. Total production to the end of 1927 amounted to 584,866 barrels.

SORRENTO (McElroy) FIELD

The Sorrento or McElroy dome came into public notice during June, 1927, when the Gulf Refining Company's No. 1 United Lands Company in Section 15, T 10 S, R 4 E, Ascension Parish, blew out at 1618 feet and swallowed its rig and derrick. It was estimated by the operators as making 20 million cubic feet of gas. Well No. 2 was abandoned in August, 1927, after testing salt water at 1748 feet. No. 3 was abandoned in rock salt at 2108 feet. No. 3 had a gas blow-out at 956 feet. No. 4 came in as the first oil well after blowing about 10 million cubic feet of gas on the first day. It was completed on January 22, 1928. Its production has been variously estimated from 6,000 to 10,000 barrels per day. No. 5 was abandoned on March 17, 1928, after testing salt water at 1722 feet. Sorrento shows promise of being a typical salt dome oil field and marks the first commercial production in Louisiana east of the Mississippi River.

BAYOU BOUILLON FIELD

Rycade Oil Company's No. 2 Atchafalaya Fee was completed as a producing well at 3045 feet on March 10, 1928, making 3200 barrels of oil daily together with 1,000,000 cubic feet of gas. The well is located in Section 13, T 9 S, R 8 E, St. Martin Parish. The field is still too young to make any fair estimate of its value, but its first well gives great promise.



(Photo by Griffin Studio)

INTERSTATE NATURAL GAS COMPANY'S BOOSTER PLANT AT CARGAS, LA.
This station bulids up the pressure necessary to carry Monroe gas to Baton Rouge and points south.

NATURAL GAS

Table IX gives the production of the ten largest gas producing states from 1924 to 1926. During these years Louisiana has ranked fourth among the producers in 1924 and 1925, and fifth in 1926. In 1920 Louisiana filled sixth position. In 1921, the state passed Ohio and assumed fifth place, maintained it in 1922 and 1923, and passed Pennsylvania in 1924 to take fourth position. Oklahoma, California, West Virginia and Texas produced more gas than Louisiana in 1926. West Virginia production, however, has been slowly declining, and it is quite probable that during 1927 that state dropped below Texas and yielded fourth position to Louisiana. Complete figures on production for 1927 from states other than our own are not yet available.

Though holding an enviable position in regard to production, Louisiana is lowest of the 24 producing states in regard to average value of natural gas at the well and at points of consumption. This condition is partly due to the fact that a great volume of cheap gas is sold to carbon black plants and consumed close to the point of production without heavy transportation and distribution charges. With the development now taking place in Louisiana's domestic and industrial market, both in the state and beyond its borders, this low average price at the well and at points of consumption will show a decided rise. Gas purchasing agencies entering the Louisiana fields during 1927 have already improved the price at the well by offering at least one to one and a half cents per thousand cubic feet above the usual prevailing prices. This price raising will continue with the planning and laying of new pipe lines to central and south Louisiana towns, as well as to industrial centers outside the state. During 1926 and 1927 two major lines were laid into Texas, one to the Houston district on the Gulf Coast and one to Dallas and Fort Worth. One new line was laid to the El Dorado district in southern Arkansas, with an extension to Camden. Lines planned for 1928 include three major propositions, one line to Memphis, and possibly to St. Louis; one to Mississippi serving Vicksburg, Jackson,

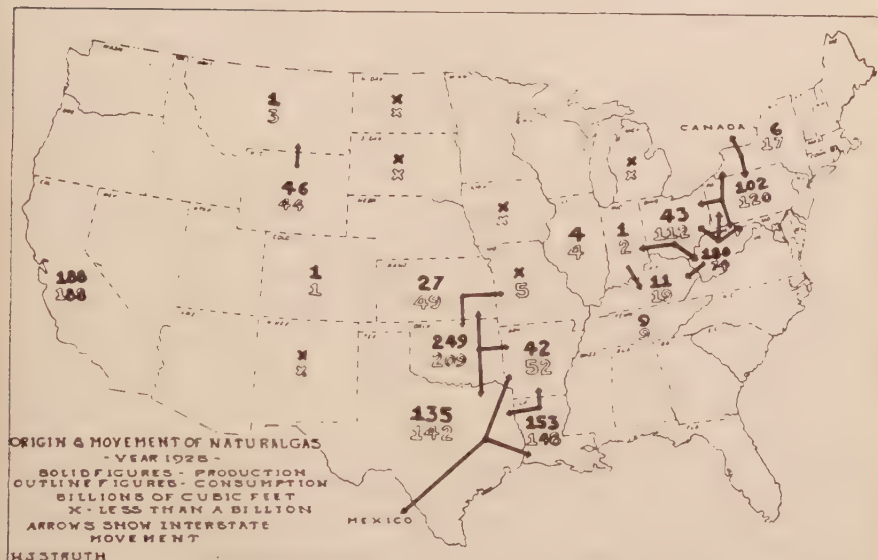
Table No. IX
TEN LARGEST GAS PRODUCING STATES OF THE UNITED STATES

State—	Volumes Produced M. cu. ft.				Average value per M. cu. ft. at well (cents)				Average value per M cu. ft. at point of consumption (cents)			
	1924	1925	1926		1924	1925	1926		1924	1925	1926	
Oklahoma	214,452,000	249,285,000	286,421,000		7.0	7.4	8.0		13.1	14.5	14.7	
California	189,692,000	187,789,000	204,915,000		7.5	7.5	8.2		19.0	17.4	17.3	
West Virginia	182,285,000	180,345,000	180,223,000		13.5	13.8	13.6		23.3	39.3	42.4	
LOUISIANA	160,945,000	156,615,000	159,296,000		3.1	3.1	3.1		4.2	5.3	5.6	
Texas	107,247,000	134,872,000	175,392,000		3.8	5.2	5.7		13.9	14.6	16.1	
Pennsylvania	105,863,000	101,632,000	107,089,000		23.7	24.0	23.4		42.0	46.3	46.7	
Ohio	47,396,000	43,235,000	47,363,000		17.6	17.9	18.5		51.7	51.8	53.6	
Wyoming	46,036,000	45,539,000	46,567,000		3.7	4.2	4.7		8.4	9.1	10.0	
Arkansas	36,616,000	41,878,000	43,566,000		4.8	6.0	4.6		13.4	12.9	13.4	
Kansas	25,580,000	26,917,000	38,095,000		8.3	8.2	7.6		27.3	37.1	32.9	

FIGURE 4.

INTERSTATE MOVEMENT OF NATURAL GAS IN 1925

From: "Natural Gas", June, 1927.



by the presence of large reserves of crude oil in the same sand. When oil and gas are produced from the same horizon, the gas reserves are usually dissipated in the recovery of the oil. The operators in the district are now engaged in conferences with the Department of Conservation and the United States Bureau of Mines, and it is safe to say that all possible means of gas conservation will be tried out in the attempt to protect the Cotton Valley reserves. In all probability, however, the Shreveport area will have to draw on the Monroe and Richland fields for domestic and industrial gas to carry the district over the winter peak of 1928-1929. During the winter season of 1927-1928, the Shreveport area was pinched for gas during every cold spell. Industrial gas was cut off in Texarkana on more than one occasion. Marshall, Dallas,, and Fort Worth, all using gas from the Shreveport area, experienced similar periods of shortage.

The export of gas in large quantities from Louisiana has frequently called forth unfavorable comment. The question of interstate movement of gas is interesting. Out of more than twenty producing states, only four states produce gas in excess of their own requirements, according to Bureau of Mines figures for 1925, Oklahoma, West Virginia, Louisiana and Wyoming. In 1926 Colorado was added to the list, but Colorado's excess production is still negligible. Export from Louisiana has been to Texas and Arkansas. From Arkansas, there is no return. From Texas, however, Louisiana obtains considerable gas. In 1925 Louisiana exported to Arkansas 8,370,000,000 cubic feet, and in 1926, 8,063,000,000 cubic feet. In 1925 Louisiana exported to Texas 6,321,000,000 cubic feet, and in 1926, 6,419,000,000 cubic feet. In 1925 Louisiana imported from Texas 10,071,000,000 cubic feet, and in 1926, 5,945,000,000 cubic feet. In 1925, therefore, Louisiana imported 3,750,000,000 cubic feet more than Texas took from Louisiana. In 1926 the tables were turned and Louisiana exported 474,000,000 cubic feet to Texas than Texas gave in return. Total exports from Louisiana in 1925 amounted to 14,691,000,000 cubic feet. Exports exceeded im-

Table XIIIa
NATURAL GAS BALANCE SHEET—1926
(Millions of cubic feet)

State—	Production	Imports	Consumption	Exp'ts
Arkansas -----	43,566	9,064	52,630	-----
California -----	204,915	-----	204,915	-----
Colorado -----	554	-----	504	50
Illinois -----	3,808	-----	3,808	-----
Indiana -----	901	1,361	1,854	408
Kansas -----	38,095	29,279	61,142	6,232
Kentucky -----	10,410	9,311	18,126	1,595
Louisiana -----	159,296	5,945	150,759	14,482
Michigan -----	(A)	-----	(A)	-----
Missouri -----	1	5,818	5,819	-----
Montana -----	2,283	1,012	3,295	-----
New Mexico -----	921	-----	921	-----
New York -----	7,027	10,933	17,864	96
Ohio -----	47,363	74,426	115,719	6,070
Oklahoma -----	286,421	414	244,993	41,842
Pennsylvania -----	107,089	33,528	125,836	14,781
South Dakota -----	10	-----	10	-----
Tennessee -----	12	-----	12	-----
Texas -----	175,392	18,746	187,341	6,797
West Virginia -----	180,223	8,723	72,784	116,162
Wyoming -----	46,567	50	45,605	1,012
Other (B) -----	38	751	789	-----
Totals -----	1,314,892	209,361	1,314,726	209,527

(A)—Less than 1,000,000 cubic feet.

(B)—Alaska, Maryland (consumption only), and North Dakota.

—Compiled from Bureau of Mines "Natural Gas in 1926"

ports by 4,620,000,000 cubic feet. In 1926 total exports from Louisiana amounted to 14,482,000,000 cubic feet, and total imports to 5,945,000,000 cubic feet. Exports in 1926 exceeded imports by 8,537,000 cubic feet. Net exports for 1926 exceed net exports for 1925 by 3,917,000,000 cubic feet. Net export of Louisiana gas is increasing and will increase more rapidly as new lines built in 1927 or prospected for 1928 will increase exports materially, whereas the imports, coming as they do from the declining Texas- Waskom field will gradually decrease.

These interstate movements are shown in Figure 4,

Table XIIIb

NATURAL GAS PRODUCTION AND CONSUMPTION—YEAR 1926

Rank of Producing States			Rank of Consuming States		
	Cubic Feet			Cubic Feet	
1. Oklahoma -----	286,421,000,000		1. Oklahoma -----	244,993,000,000	
2. California -----	204,915,000,000		2. California -----	204,915,000,000	
3. West Va.-----	180,223,000,000		3. Texas -----	187,341,000,000	
4. Texas (A)-----	175,392,000,000		4. Louisiana -----	150,759,000,000	
5. Louisiana -----	159,296,000,000		5. Pennsylvania ---	125,836,000,000	
6. Pennsylvania ---	107,089,000,000		6. Ohio -----	115,719,000,000	
7. Ohio -----	47,363,000,000		7. West Virginia---	72,784,000,000	
8. Wyoming -----	46,567,000,000		8. Kansas -----	61,142,000,000	
9. Arkansas -----	43,566,000,000		9. Arkansas -----	52,630,000,000	
10. Kansas -----	38,095,000,000		10. Wyoming -----	45,605,000,000	
11. Kentucky -----	10,410,000,000		11. Kentucky -----	18,126,000,000	
12. New York (B)---	7,027,000,000		12. New York-----	17,864,000,000	
13. Illinois -----	3,803,000,000		13. Missouri -----	5,819,000,000	
14. Montana -----	2,283,000,000		14. Illinois -----	3,808,000,000	
15. New Mexico-----	921,000,000		15. Montana -----	3,295,000,000	
16. Indiana -----	901,000,000		16. Indiana -----	1,854,000,000	
17. Colorado -----	554,000,000		17. New Mexico-----	921,000,000	
18. Tennessee -----	11,500,000		18. Colorado -----	503,800,000	
19. S. Dakota-----	10,100,000		19. Tennessee -----	11,500,000	
20. Missouri -----	1,000,000		20. S. Dakota-----	10,100,000	
21. Michigan -----	400,000		21. Michigan -----	400,000	
22. Alaska -----)			22. Alaska -----)		
23. N. Dakota-----)	38,200,000		23. Maryland -----)		
			24. N. Dakota-----)	789,200,000	
Grand Total-----1,314,892,200,000			Grand Total-----1,314,726,050,000		

(A)—Includes 87,000,000 cubic feet delivered to Mexico.

(B)—Includes 79,000,000 cubic feet delivered to Canada.

—Compiled from Bureau of Mines "Natural Gas in 1926"

and Tables XIIa, XIIb, XIIIa, and XIIIb. In these tables the figures given for Louisiana do not check exactly the figures published by the Department of Conservation, but are based on figures published by the Bureau of Mines. The department figures are probably more accurate while the bureau figures are accurate enough for comparisons among the states.

CADDO GAS FIELD

(Not including Waskom and Elm Grove)

The Caddo field was the producer of Louisiana's first commercial gas in May, 1905. Very little informa-

Table X11a
NATURAL GAS BALANCE SHEET—1925
(Millions of Cubic Feet)

State—	Production	Imports	Consumption	Exp'ts
Arkansas -----	41,878	9,665	51,543	-----
California -----	187,789	-----	187,789	-----
Colorado -----	574	-----	574	-----
Illinois -----	4,165	-----	4,165	-----
Indiana -----	1,168	964	1,786	346
Kansas -----	26,917	27,272	48,684	5,505
Kentucky -----	10,770	9,434	18,601	1,603
Louisiana -----	152,620	10,071	148,000	14,691
Michigan -----	(A)	-----	(A)	-----
Missouri -----	34	5,338	5,372	-----
Montana -----	1,496	1,112	2,608	-----
New York -----	6,210	10,389	16,503	96
Ohio -----	43,235	70,522	111,969	1,788
Oklahoma -----	249,285	167	209,458	39,994
Pennsylvania -----	101,632	30,520	119,475	12,677
South Dakota -----	4	-----	4	-----
Tennessee -----	9	-----	9	-----
Texas -----	134,872	18,494	142,485	10,881
West Virginia -----	180,345	4,549	74,250	110,644
Wyoming -----	45,539	-----	44,427	1,112
Other (B) -----	29	708	737	-----
Total -----	1,188,571	199,205	1,188,439	199,337

(A)—Less than 1,000,000 cubic feet.

(B)—Alaska, Iowa, New Mexico, North Dakota and Maryland.
—From "Natural Gas", June, 1927.

tion is obtainable on its early production. There was no market for the gas and it was recklessly blown into the air under the mistaken impression that it would soon "go to oil". In practically all cases where this fallacy has controlled operations in north Louisiana the gas has "gone to salt water" instead of oil. The location of the field is the same as that given for the Caddo oil field. It is supposed that prior to 1918, the production of the field amounted to about 33,000,000,000 cubic feet. This is hardly more than a guess at saved gas. It is beyond human power to estimate the amount of gas wasted from 1905 to 1918. 1919 furnished peak production with 15,820,211,000 cubic feet.

Table XIIb

NATURAL GAS PRODUCTION AND CONSUMPTION—YEAR 1925

Rank of Producing States		Rank of Consuming States	
	Cubic Feet		Cubic Feet
1. Oklahoma -----	249,285,000,000	1. Oklahoma -----	209,458,000,000
2. California -----	187,789,000,000	2. California -----	187,789,000,000
3. West Va.-----	180,345,000,000	3. Louisiana -----	148,000,000,000
4. Louisiana -----	152,620,000,000	4. Texas -----	142,485,000,000
5. Texas (A)-----	134,872,000,000	5. Pennsylvania ----	119,475,000,000
6. Pennsylvania ----	101,632,000,000	6. Ohio -----	111,969,000,000
7. Wyoming -----	45,539,000,000	7. West Va.-----	74,250,000,000
8. Ohio -----	43,235,000,000	8. Arkansas -----	51,543,000,000
9. Arkansas -----	41,878,000,000	9. Kansas -----	48,684,000,000
10. Kansas -----	26,917,000,000	10. Wyoming -----	44,727,000,000
11. Kentucky -----	10,770,000,000	11. Kentucky -----	18,601,000,000
12. New York (B)--	6,210,000,000	12. New York-----	16,503,000,000
13. Illinois -----	4,165,000,000	13. Missouri -----	5,372,000,000
14. Montana -----	1,496,000,000	14. Illinois -----	4,165,000,000
15. Indiana -----	1,168,000,000	15. Montana -----	2,608,000,000
16. Missouri -----	34,000,000	16. Indiana -----	1,786,000,000
17. Tennessee -----	8,500,000	17. Colorado -----	574,000,000
18. South Dakota----	4,200,000	18. Tennessee -----	8,500,000
19. Michigan -----	400,000	19. South Dakota----	4,200,000
20. Alaska -----)		20. Michigan -----	400,000
21. Iowa -----)	28,500,000	21. Alaska -----)	
22. New Mexico-----)		22. Iowa -----)	
23. North Dakota----		23. Maryland -----)	736,500,000
		24. New Mexico-----)	
		25. North Dakota----	
Grand Total-----	1,188,571,000,000	Grand Total-----	1,188,571,000,000

(A)—Includes 64,000,000 cubic feet delivered to Mexico.

(B)—Includes 68,000,000 cubic feet delivered to Canada.

Production declined steadily until 1925 when the first Glenn Rose gas began to make itself felt. Between 1924 and 1927, the annual production almost trebled due to Glenn Rose production. The field produced 11,956,293,000 cubic feet in 1927, and a total of 115,093,818,000 cubic feet between discovery and the end of 1927. Owing to the rapid exhaustion of the Glenn Rose, it is quite probable that Caddo will show a decided decline in gas production for 1928.

WASKOM GAS FIELD

The Waskom gas field is located in the southeast

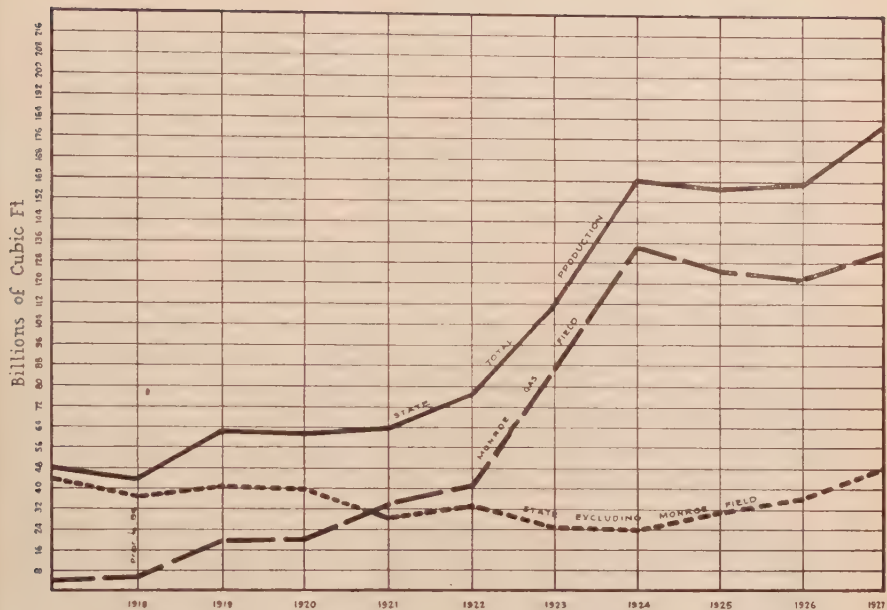


Figure 6—GAS PRODUCTION CURVE IN LOUISIANA

corner of Harrison County, Texas, and in T 17 N, R 16 W, Caddo Parish, Louisiana. The discovery well was just over the line in Texas and was completed in May, 1924. The field has been overdrilled and overpulled due to the fact that the State of Texas, in which most of the field lies, has no practical restrictive gas laws. The decline of the field has been rapid and water troubles are constantly in evidence. Though there is some chance of deeper production, its commercial value is still questionable. One or two wells on the Texas side showed a small amount of oil but have never made commercial producers. The Nacatoch, Blossom and the so-called "2800 foot" horizon furnish the gas. There has been a small extension of the field in the Greenwood area during 1927. Only small wells, however, have rewarded prospectors in the new section. The Waskom gas field showed its peak production in 1927, amounting to 2,047,307,000 cubic feet, making a total production to the end of 1927, of 4,506,754,600 cubic

GAS PIPE LINES IN LOUISIANA

As of April 15, 1928

Many small field and gathering lines and lines used temporarily for drilling operations are not included in this list.

Parish in which line begins	Size of line	No. of miles	Point of beginning	Point of ending
The Palmer Corp. of La.				
Bossier	12"	22.4	Elston Junct. in Elm Grove Field	Ford St. Station, Shreveport.
	8"	9.4	Elston Junct. in Elm Grove Field	Intersection of 12" line on Caddo side, Red River.
Reserve Natural Gas Company				
Bossier	16"	15	Elm Grove Gas Field	Shreveport, La.
Bossier	10"	4.75	Center of S $\frac{1}{2}$, Sec. 10-22N-12W (Ties in with main 14" Caddo Web- ster Line)	Carterville Field N. line, Sec. 22-23N-12W
Bossier	10"	14	Center of S $\frac{1}{2}$, Sec. 10-22N-12W (Ties in with main 14" Caddo Web- ster Line)	Cotton Valley Field, NE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 28-21N-10W.
Arkansas Natural Gas Co.				
Caddo	16"	10.44	Vivian, La.	Arkansas State Line.
	12"	10.41	Rogers Station at Lewis	Vivian, La.
Caddo	10"	13.4	Rogers Station at Lewis	Vivian, La.
Bethany Oil & Gas Company				
Caddo	10" & 12"	20.57	Bethany, La.	Shreveport, La.
Dixie-Gulf Gas Company				
Caddo	16"	12	6.2 miles from Waskom, Texas, enters Louisiana state line	Mooringsport, La.
The Palmer Corp. of La.				
Caddo	8"	24.46	Ford St. Station, Shreveport	Arkansas Natl. Gas Co.'s line at Rogers Station, Mooringsport, La.

Caddo	12"	*9.20	Magnolia Gas Company Connects with main line from Caddo to Webster in Sec. 34-20N-14W, Cad- do Parish-----	On West side of Black Bayou in Sec. 24-21N-15W, Caddo Parish.
Caddo	16"	25	Reserve Natural Gas Co. Bethany Gas Field-----	For ^d St. Station, Shreveport.
Caddo	16"	20	Petzer Station, Shreveport-----	Mooringsport, La.
Caddo	14"	41	Line intersects with 16" main line in SW ¹ / ₄ of NW ¹ / ₄ of Sec. 20-T20N-R15, Caddo Parish-----	
Caddo	6"	17	Southwestern Gas & Electric Co. Shreveport-----	Dawes Station.
Caddo	6"	2.19	Dawes Station-----	Oil City, La.
Caddo	8"	22.57	Dawes Station-----	Arkansas state line.
Claiborne	6"	21	Northwest Louisiana Gas Co. Homer, La.-----	Arcadia, La. (Bienville Parish.)
Bienville	4"	4.50	Main line between Homer and Arcadia-----	Gibbsland.
De Soto	6"	8.50	Louisiana Public Utilities Co. Sec. 10-12N-12W-----	Mansfield, La.
Morehouse	12"	14.50	Excelsior Pipe Line Co. Bastrop, apprx. 1300S and 1000W of NE corner of Sec. 3-20N-5E, More- house Parish-----	West Monroe, La., approximately 1200W and 1500S of center of Sec. 3-17N-3E, Ouachita Parish or Brown Paper Mill.
Morehouse	8"	3.50	NW corner Sec. 16-22N-5E-----	U. S. Carbon Co. plant in Sec. 3-20N-5E.
Morehouse	8"	5.8		
Morehouse	6"	4.3		
Morehouse	4"	2.2		
Morehouse	12"	17.05	Quachita River crossing. Line between Townships 21 and 22, Range 4 East-----	From beginning thence due west to NW corner Twp. 21, thence south to Ouachita City, Sterlington and Fowler, where it connects with main Bastrop- Monroe line.

*—Approximately.

All Companies				
Morehouse	4", 6" & 8"	*50.00	From individual wells in parish	Various carbon black plants.
Ouachita	7" I.D.	44	Advance Bag & Paper Co. Lamkin, La.	Hodge, La.
Ouachita, et al.	22"	170 6	Interstate Natural Gas Co., Inc.	
E. Baton Rouge	18"	71.84	Fowler, Ouachita Parish	Standard Oil Refinery, Baton Rouge.
			Baton Rouge-Scotland compressor station	Destrehan, La.
Ouachita	16"	30.9	Louisiana Arkansas Pipe Line Co. Sec. 37-20N-4E, Sterlington, La.	Enters State of Arkansas crossing Louisiana state line in Sec. 1-23-1W.
Ouachita	4" & 6"	14.4	Ouachita Natural Gas Co.	
Ouachita	6" & 8"	10	Sec. 27-20N-4E, in field	Sec. 25-18N-3E, Monroe, La.
Ouachita	8 $\frac{5}{8}$ "	10.9	Sec. 11-18N-4E, Fairbanks, La.	Sec. 25-18N-3E, Monroe, La.
			SW $\frac{1}{4}$ of Sec. 4-19N-4E	Sec. 50-18-N-3E, on Hudson Lane in City of Monroe.
Ouachita	6" & 8"	110	Southern Gas Lines, Inc. Monroe Gas Field	Alexandria, La.
Ouachita	4", 6" & 8"	46.52	All Companies in Ouachita Parish (Other than listed)	
Richland	10"	*45	Natural Gas & Fuel Corp. About center of Township 16, Range 6E, Richland Parish	Various carbon black plants.
Terrebonne	6"	21	Terrebonne Gas Company Terrebonne Gas Field	Houma, La.
Union	4"	8	People's Gas & Fuel Co. Sec. 14-20N-3E, Talton No. 1	Ruston, La.
			(2 miles 2" pipe from Talton to Miller No. 1)	

*—Approximately.

Northwest Louisiana Gas Co.

Webster	4"	14	Sec 1-22N-10W	Sec. 30-23N-8W.
	6"	4	Sec. 30-23N- 8W	Sec. 14-23N-8W.
	8"	14	Sec. 19-23N- 8W	Sec. 18-21N-7W.
Webster	6"	8	Sec. 23-23N- 9W	Haynesville, La.
	4"	12	Sec. 23-23N- 9W	5 miles west from NE corner of Sec. 34-23-10, Spanish Grant E, east line.

Magnolia Petroleum Company

Sec. 35-23N-11W-----Haynesville, La.

Magnolia Gas Company

Line enters Louisiana at approximately the SW corner of N $\frac{1}{2}$ of Frac.
Sec. 19, Twp. 17N, Range 16W-----

Main line ends in NW $\frac{1}{4}$ of Sec. 30-22-10, Webster Parish. Crosses Red River in E $\frac{1}{2}$ of SW $\frac{1}{4}$ of Sec. 26-20-14.

Webster 12" 11.30 Sarepta Station in N $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 30-21-10, Webster Parish-----800' N of SW corner of Sec. 22-23-12, Carterville Field, Bossier Parish.

Webster 10" *3 Sarepta Station, Webster Parish, Sec. 20-21-10-----Runs due north.

Webster 12" 8.40 Sarepta Station, Webster Parish, Sec. 30-21N-10W-----Runs about 1000' N of center of S line of Sec. 32-23N-9W, Webster Parish.

Minden Gas Company

Sec. 15-21N-10W-----Minden, La.

Ohio Oil Company

Webster 2"-3"-4"-6" 20.9 Shongaloo Gas Field, Webster Parish-----Haynesville Oil Field, Claiborne Parish.

Palmer Corporation

Webster 12" 4.948 Spring Hill, La-----Ford St. station, Shreveport.

8" 33.306 Spring Hill, La-----Ford St. station, Shreveport.

6" 8.865 Main line near Spring Hill, La-----Cotton Valley La.

*--Approximately.

feet. In spite of this increase during 1927, the future of the field is dubious.

DE SOTO-RED RIVER GAS FIELDS

The De Soto-Red River gas fields are roughly the same in location as the oil fields of these parishes. 1918 was the peak year for De Soto production with 6-1/3 billion cubic feet. The field declined steadily until the last two or three years. It is now very gradually increasing its production, which in 1927 reached 1,819,-814,000 cubic feet. From its discovery in 1912 to the end of 1927, the field produced 35,796,628,825 cubic feet. This figure is somewhat uncertain owing to lack of information on production prior to 1918.

Red River Parish gas was discovered in 1918, reached its peak production in 1919, amounting to 1,541,567,000. Steady decline has marked the history of the field until 1927 when a very slight increase is noted. During 1927 the field produced 362,540,000 cubic feet, making a total, since discovery, of 6,492,-929,000 cubic feet. The De Soto-Red River gas areas are no longer of major importance. Pressure is low and volume has declined almost to the economic limit in most of the wells.

ELM GROVE GAS FIELD

The Elm Grove gas field lies mainly in Bossier and partly in Caddo Parish. Its location is the same as the Elm Grove oil field. The field was discovered in 1916. Peak production, 26,904,390,000 cubic feet was reached in 1920. The field declined steadily in 1926 at which time annual production fell off to 5,814,191,000 cubic feet. Two recent extensions, the Sligo and Caspiana areas, together with news wells drilled in the old field, have checked the decline. In 1927 the field produced 7,958,818,000 cubic feet, making a total of 146,-726,056,000 cubic feet up to the end of 1927. Elm Grove, in the past, has been an important factor in Shreveport's gas supply. The field is now low in pressure, the Nacatoch sand being reduced to about 45 to

50 pounds, and the deeper sand to about 550 pounds. The effective life of the field will probably soon be ended. There is a possibility however that the depleted Nacotoch sand, relatively free of water, may be used for storage of surplus gas from other fields.

COTTON VALLEY FIELD

The location of the gas area in Cotton Valley is the same as that of the oil field. The field was discovered in 1923 and gave every indication of long life under proper handling. The central gas area on top of the structure was surrounded by a ring of oil production, and the gas was sacrificed under the exploded theory that the gas "might" blow into oil. In spite of the rapid depletion of the Blossom Sand horizon, production is increasing due to the development of the 4300 foot Glenn Rose production. This horizon yields small wells with very rich gas. Gasoline recovery has exceeded 1000 gallons per million cubic feet in some instances. Up to the recent completion of a gas well in the same area in the 4600 foot Trinity horizon, this was the richest gas produced in Louisiana. The 4600 foot gas is estimated to yield 1500 gallons per million cubic feet of gas. The only gas well yet completed at the 4600 foot level gauged 54,648,000 cubic feet per day. Cotton Valley produced 5,341,222,700 cubic feet in 1927, making a total of 12,824,841,700 cubic feet since its discovery.

GLEASON AND SPRING HILL FIELDS

The Gleason field lies in T 22 and 23 N, R 9 and 10 W, Webster Parish. The Spring Hill field lies in T 22 and 23 N, R 11 W, in Bossier and Webster Parishes. The former was discovered in 1922 and the latter in 1923. These two fields are very similar, particularly in regard to their sand and water conditions. Control of the fields is difficult due to the presence of loose sand and strong water flow. It is so dangerous to open up wells in certain parts of the fields that the required annual gauges of wells in these particular

Table No. VIII
ESTIMATED METERED GAS PRODUCTION OF LOUISIANA
(Cubic Feet)

Year	Caddo Parish (Except Waskom & Elm Grove)	DeSoto Parish	Red River Parish	Elm Grove Fld. (Bossier & Caddo Pshs.)
Prior to 1918 est	33,000,000,000*	10,000,000,000*		703,532,000
1918	15,603,420,000	6,369,139,000	979,711,000	15,310,071,000
1919	15,820,211,000	4,345,799,000	1,541,567,000	19,595,960,000
1920	7,460,938,000	3,700,047,825	1,368,335,000	26,904,390,000
1921	5,812,957,000	2,123,945,000	355,152,000	20,266,160,000
1922	4,911,491,000	1,367,004,000	117,573,000	21,479,736,000
1923	3,369,285,000	1,246,261,999	788,542,000	13,294,431,000
1924	3,316,600,000	1,361,568,000	336,738,000	8,460,102,000
1925	4,839,543,000	1,683,830,000	321,473,000	†7,298,665,000
1926	9,003,080,000	1,779,221,000	321,298,000	\$5,814,191,000
1927	11,956,293,000	1,819,814,000	362,540,000	\$7,598,818,000
Total	115,093,818,000	35,796,628,825	6,492,929,000	146,726,056,000

Year	Caddo Parish (Waskom Field)	Webster Psh. Cotton Valley Field)	Webster Psh. (Gleason Field)	Bossier & Web- ster Parishes (Spring Hill Field)
1922			6,297,303,500	
1923		9,950,000	5,772,197,900	272,752,000
1924	135,755,000	1,469,891,000	5,141,656,100	3,543,471,000
1925	1,270,391,100	2,210,695,000	9,347,084,000	3,500,290,000
1926	1,053,301,500	3,793,083,000	9,592,886,000	5,840,237,500
1927	2,047,307,000	5,341,222,700	10,409,651,400	4,119,347,500
Total	4,506,754,600	12,824,841,700	46,560,778,900	17,276,098,000

*—Not metered.

†—Includes Sligo Extension.

\$—Includes Sligo and Caspiana Extensions.

Year	Bossier Parish (Carterville Field)	Winn Parish
1927	2,740,432,000	3,225,000

Year	Morehouse, Ouachita and Union Parishes (Monroe Field)	Richland Par- ish Field	Terrebonne Psh. (Houma Field)	Sabine Parish
1916	*100,000,000			
1917	*4,500,000,000			
1918	6,093,000,000		189,603,500	
1919	20,291,000,000		646,048,400	
1920	20,300,503,000		890,942,800	
1921	33,358,327,000		743,316,900	
1922	41,796,843,000		625,901,575	
1923	86,582,443,000		555,307,325	
1924	135,204,603,000		595,666,500	
1925	125,496,213,000		646,765,300	
1926	121,614,208,000	950,000	483,875,829	
1927	132,895,666,000	1,837,404,000	7,141,000	30,931,000
Total	728,232,806,000	1,838,354,000	5,384,569,129	30,931,000

*—Not metered.

RECAPITULATION

Estimated Louisiana Year-ly Gas Production

(Cubic Feet)

Prior to '18	48,303,532,000
1918	44,544,944,500
1919	62,240,585,000
1920	60,625,156,625
1921	62,659,857,900
1922	76,595,852,075
1923	111,891,169,225
1924	159,566,050,600
1925	156,614,949,400
1926	159,296,331,829
1927	181,169,793,000
Total	1,123,508,222,154

Estimated Total Gas Production of Louisiana by Fields

Caddo Parish (except Waskom)	115,093,818,000
Waskom Field (La. Side)	4,506,754,600
Elm Grove Field	146,726,056,000
Carterville Field	2,740,432,000
DeSoto Parish	35,796,628,825
Red River Parish	6,492,929,000
Monroe Field	728,232,806,000
Richland Field	1,838,354,000
Sabine Parish	30,931,000
Cotton Valley (Webster Psh.)	12,824,841,700
Gleason Field (Webster Psh.)	46,560,778,900
Spring Hill Field	17,276,098,000
Terrebonne Psh. (Houma Fld.)	5,384,569,129
Winn Parish	3,225,000

Total 1,123,508,222,154

areas necessarily have been waived by the department. New wells have held the production up fairly well but water trouble has become so persistent and closed pressure so low that the effective life of the fields is limited. Gleason produced 46,560,778,900 cubic feet, and Spring Hill produced 17,276,098,000 cubic feet up to the end of 1927.

CARTERVILLE GAS FIELD

Carterville gas field was first produced in 1927 and yielded 2,740,432,000 cubic feet. The wells came in with a large volume and normal rock pressure for the depth but soon "went to water". The brief history of the field is very disappointing. A small extension to the southeast around the Wilkinson lease in 36 T 23, N 12 W, gives promise of holding out better than the older parts of the field.

SIKES FIELD

In 1927 the Ohio Oil Company produced 3,225,000 cubic feet of gas on the Sikes salt dome in Winn Parish. Up to the present this field shows nothing very hopeful for future gas supply. The area has not yet been fully prospected.



Exterior view of Thermatonic Carbon Company's plant at Sterlington

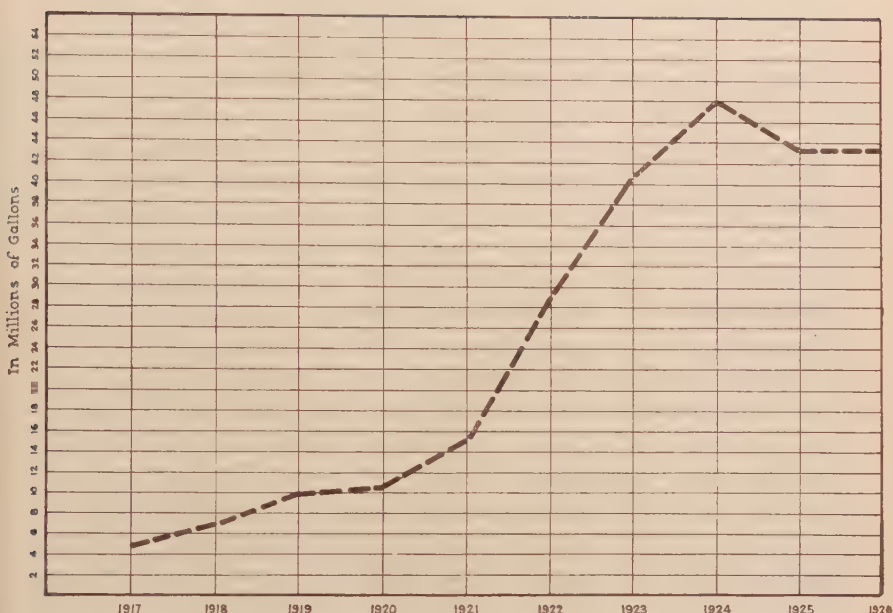


Figure 7—NATURAL GAS GASOLINE PRODUCTION IN LOUISIANA

MONROE GAS FIELD

Monroe gas field lies in T 18 to 22 N, R 3to 6 E, in Ouachita, Union, and Morehouse Parishes, Louisiana. The field is the largest in the state. Figure No. 6 gives an idea of its relative importance as compared with production from all other fields. Gas was discovered in 1909 but the first commercial well was completed in 1916. At that time there was apparently no market for the gas and no likelihood that a market might be developed. Carbon black operators were attracted by the large reserves indicated by early surveys and their plants were soon in operation. As a considerable share of the profit in carbon black operations comes from earnings on gasoline stripped before the gas is burned into black, the carbon plants have been operating more intensively in those parts of the field where wet gas is obtained. These areas are in the southeastern end of the field, particularly in the vicinity of

Swartz. The coming of the carbon black operators has served to give the Monroe field a market for its gas, and the tremendous production built up by these firms has served to attract the attention of gas distributing agencies to the great possibilities of the Monroe area as a source of gas for domestic and industrial markets. The continued growth of the carbon industry and the reckless methods which marked its early expansion in the field, have undoubtedly caused a certain fear among other users of gas that the life of the field was in jeopardy. Since recklessness and extravagance have been checked by the work of the Department of Conservation and the field itself has stood the great strain of overpulling during 1922 and 1923, the confidence of other gas agencies has been restored. From 1926 on, it is expected that the carbon black load will be gradually diverted into domestic and industrial channels. The price of gas at the well has shown a tendency to increase, and as carbon black operations by present methods are limited to areas of cheap gas, it is to be expected that rising prices will force the industry to seek new supplies. The carbon black price is fairly well stabilized at 6 cents per pound. Only one pound of carbon is obtained from 1000 cubic feet of gas. With gas at 3 cents per 1000 cubic feet, only 3 cents is left to the carbon operator for profit and cost of operation. Whether the carbon industry could operate on 4-cent gas is very doubtful. The effect of the probable rise in gas prices and the restrictive measures adopted by the Department of Conservation is already in evidence. Of the 2804 burning houses built in the Monroe field only 2103 are now in operation. There are 353 houses idle and 348 have been moved. Most of the moved houses are either in operation or are being assembled in the West Texas fields where gas is still a drug on the market.

There has been very little change in the condition of the field since the complete survey made in February, 1927. The following figures give an idea of the condition of the field at that time.

Open flow capacity 3,485,280,692 cubic feet.

Daily average withdrawal 370,705,616 cubic feet.

Table No. X

**NATURAL GAS-GASOLINE PRODUCED
IN LOUISIANA**

Year	Total Gallonage*
1917	4,980,000
1918	7,021,000
1919	10,063,000
1920	10,610,000
1921	15,341,000
1922	29,406,000
1923	40,720,000
1924	48,098,000
1925	43,489,000
1926	43,557,000

*—Includes Casing-head gas.

Daily average withdrawal is 10.64% of open flow capacity.

Daily average consumption for carbon black 244,-346,000 cubic feet.

Daily average consumption for carbon black is 7.01% of open flow capacity.

Daily average consumption for carbon black is 65.92% of daily average withdrawal.

Daily average consumption for domestic and industrial use, 126,359,616 cubic feet.

Daily average consumption for domestic and industrial use is 3.63% of the open flow capacity.

Daily average consumption for domestic and industrial use is 34.08% of daily average withdrawal.

About 2/3 of the gas produced in Monroe field is used by the carbon black industry, and about 1/3 is used for domestics and industrials. The total daily withdrawal is only about 1/10 of the capacity of the field.

The regauge of the field made February, 1928, shows a total open flow capacity of 3,470,698,000 cubic feet with 514 wells capable of producing and 426 wells actually being produced. The decrease in open flow capacity of approximately 4½ million cubic feet per day is negligible inasmuch as further drilling in the relatively undeveloped zones in the field, north and west of the

intensively drilled areas, would soon make up the slight loss.

Closed pressures have, of course, declined to the greatest extent in the zones of more intensive production. The following figures give some idea of this decline.

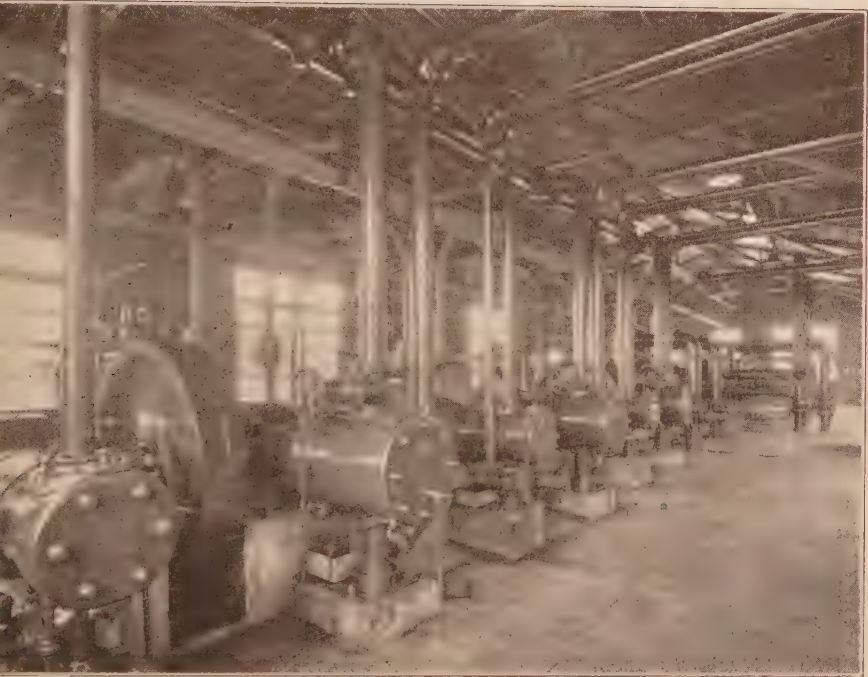
Zone	Area (Sq. Mi.)	Initial Press- ure	Pressure as of Feb. 10, 1927	Per- centage Decline
1. Swartz -----	35.20	1,025	247.90	75.83
2. White -----	23.50	1,025	330.90	67.72
3. Spyker -----	22.50	1,025	570.80	44.31
4. Fairbanks -----	12.72	1,025	547.20	46.62
5. Bastrop -----	15.50	1,025	760.00	25.86
6. Sterlington -----	70.52	1,025	828.20	19.20
7. Spencer -----	113.96	1,025	1,013.50	1.12
8. Morris -----	53.15	1,025	943.80	7.92

In the Swartz and White zones, the pressure has declined to the point where it becomes necessary to waive the 200 pound working pressure requirement. In the Swartz area operators are now required to hold only 150 pounds working pressure. An investigation of the White zone is now in progress with a view to the possibility of a similar reduction in that zone.

In 1927 production amounted to 132,,895,666,000 cubic feet, making the total production of the field up to the end of 1927, 728,232,806,000 cubic feet.

RICHLAND FIELD

The Richland field is not yet completely defined. It lies roughly in T 16 and 17 N. R 5 and 6 E, southwest of Rayville, and northwest of Mangham. Its northern boundary is probably about 10 miles southeast of the southern edge of the Monroe field. The gas is produced from a sand or series of sands along a contact in which the Midway of the Upper Cretaceous lies unconformably on the Glenn Rose of the Lower Cretaceous. On the edge of the field the gas is apparently produced from the equivalent of the Monroe gas rock. On the top of the structure the gas probably comes from the Midway-Glenn Rose contact. Between these two



Interior view of Southern Carbon Company's gasoline plant at Fowler

zones the gas comes from the contact between the Midway or the Arkadelphia and what probably represents the Washita of the Lower Cretaceous. The gas sand seems to be of very high porosity in parts of the field and has yielded wells with an open flow capacity in excess of 65 million cubic feet per day. Average rock pressure of the field is about 1,125 pounds. The discovery wells were on the England Planting Company holdings, and on the Hatch plantation. The England Planting Company well came in with drill stem in the hole, and the well was firmly completed without removing the drill stem. The Hatch well blew in without warning and was lost because of insufficient casing in the hole. The well blew wild for some time and made great quantities of sand. Operators interested in the area contributed a sum sufficient for fairly effective repairs, and the well is not now a source of waste.

Development in the field has been carried on with

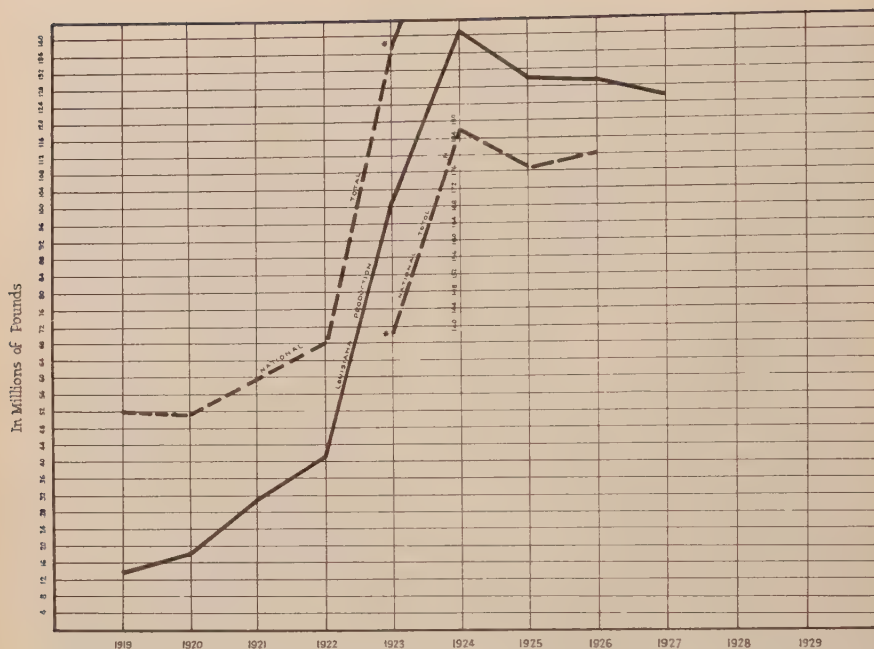


Figure 8—CARBON PRODUCTION CURVE IN LOUISIANA

reasonable care on the part of the operators with the exception of the drilling of one well. In this particular well, probably through carelessness of the crew charged with testing of pipe, a defective joint of casing was used. After the well came in making 65 million cubic feet of gas, the casing failed. The well cratered and at the time of writing was still beyond control. The crater caught fire but extinguished itself after a few days. The operator responsible for the well was instructed by the Department of Conservation to commence immediately the drilling of two relief wells. One of these was successfully completed. The other blew out and was lost at 290 feet, due to the pressure in shallow sands built up by gas escaping from the crater. A third relief well was immediately commenced. It is now completed. Through the two completed relief wells, six powerful pumps are forcing water into the sand in an attempt to kill the crater. If this method is successful an attempt

will be made to go back into the lost hole and to cement off the sand. There is a reasonable hope of success.

A meeting of the operators interested in the Richland field was called recently in Monroe in order to secure their cooperation in carrying out Richland development with every precaution taken for the safety of the field. Minimum weight of pipe and more strict cementing and testing methods were adopted. A permanent committee of operators has been appointed to act with the department in supervision of the field.

Production in the Richland field in 1926 amounted to 950,000 cubic feet. In 1927 production was 1,837,404,000 cubic feet, making a total to the end of 1927 of 1,838,354,000 cubic feet.

On March 1, 1928, total flow capacity of the field had been built up to 1,153,011,000 cubic feet from 39 completed wells of which 33 were shut in, and 6 were producing.

Table No. XI
CARBON BLACK PRODUCTION

Year	U. S. Total (Pounds)	La. Total (Pounds)	La. Percentage of Total	Cubic Feet of Gas Used Louisiana	Cubic Feet of Gas Used United States	Average Lbs. per M cu. ft. (Louisiana)	Average Lbs. per M cu. ft. (United States)
1919	52,056,941	14,024,606	27.0	21,200,000,000	---	---	---
1920	51,321,892	18,565,498	36.2	21,000,000,000	---	---	---
1921	59,766,315	31,003,615	51.9	32,072,000,000	50,565,000,000	.97	1.2
1922	67,795,129	41,966,856	62.0	38,004,000,000	53,629,000,000	1.1	1.3
1923	138,262,648	101,398,881	73.3	82,974,000,000	109,096,000,000	1.2	1.3
1924	186,872,034	144,601,550	77.5	127,812,000,000	156,514,000,000	1.1	1.2
1925	177,417,378	130,161,585	73.2	118,869,000,000	149,855,000,000	1.09	1.2
1926	180,576,176	129,564,840	72.2	108,145,251,000	139,400,000,000	1.19	1.3
1927	---	126,563,477	---	99,282,477,000	---	1.28	---



S. H. Huber Company's carbon black burning house with part of wall removed to show the interior



Last mountain of sulphur mined by Union Sulphur Company
in Calcasieu Parish

SULPHUR

Sulphur, produced in Louisiana since 1894, has been dropped from the list of developed mineral resources in this state. After producing almost 91½ million tons of pure sulphur from the salt dome at Sulphur, Calcasieu Parish, the Union Sulphur Company has been forced to shut down its operations because the deposit has been mined to its economic limit. The production from the famous Sulphur dome was obtained from over 700 wells.

In 1858, in a well being drilled for oil, the drillers discovered the sulphur deposit. Sixty-eight years later, is a well being drilled for sulphur, the drillers discovered the first oil. After discovery of the sulphur in 1858, no development was attempted for several years until a French company took over the property and drove a shaft to the sulphur body in an effort to mine

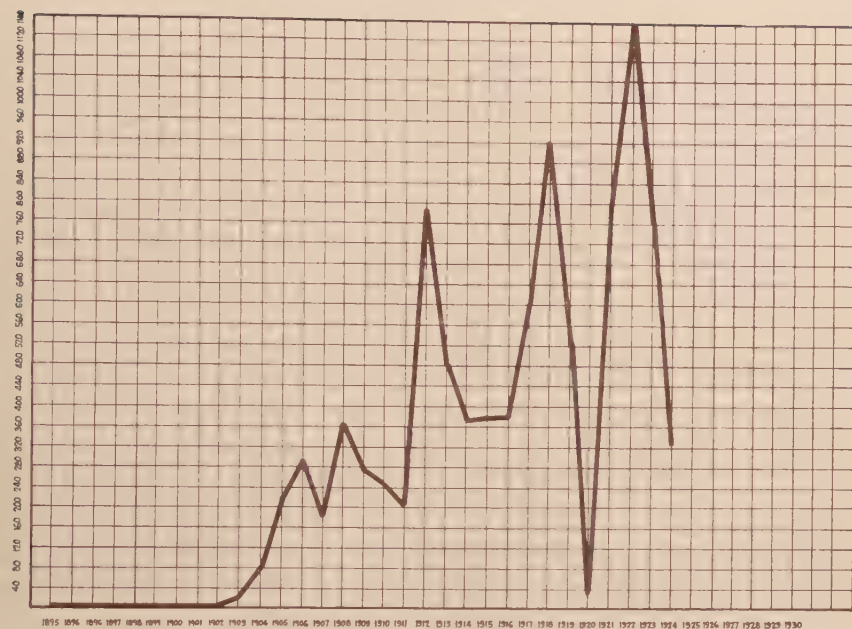


Figure 9—SULPHUR PRODUCTION CURVE IN LOUISIANA

it. The project resulted in failure after the expenditure of about \$2,000,000. An American company attempted to follow out the same plan and failed after spending about \$1,000,000. Successful development awaited the perfection of the Frasch method of sulphur mining. Herman Frasch of Cleveland, Ohio, after many discouraging attempts finally succeeded in making the project a commercial success. Frasch's method consisted of sinking wells to the sulphur body, liquifying the sulphur by forcing superheated water through one string of pipe, and raising the liquified sulphur through an inner string. The fluid is pumped from the wells to giant evaporating vats and allowed to solidify. The vats are then broken out and the solid sulphur, 99.9% pure, is blasted out of the huge blocks, and loaded in box cars for shipment.

Louisiana's one sulphur mine has passed into history but the discovery of many new salt domes, each of which is a prospective sulphur bearer, may yet bring

back the industry to the state. Many domes have been prospected, and though sulphur has frequently been found, it has not yet been discovered in commercial quantities on any but the original sulphur dome. The annual production of sulphur from 1894, when Frasch began his operations until 1924, when production ceased is given in the following table.

LOUISIANA SULPHUR PRODUCTION

Year	Tons	Year	Tons
1894-----	5	1910-----	246,510
1895-----	500	1911-----	204,220
1896-----	1,683	1912-----	786,605
1897-----	1,145	1913-----	478,565
1898-----	1,385	1914-----	374,470
1899-----	NONE	1915-----	379,885
1900-----	172	1916-----	383,065
1901-----	294	1917-----	595,130
1902-----	4,814	1918-----	918,700
1903-----	23,702	1919-----	526,250
1904-----	80,142	1920-----	37,635
1905-----	218,950	1921-----	795,980
1906-----	288,560	1922-----	1,146,860
1907-----	185,772	1923-----	768,315
1908-----	362,896	1924-----	329,230
1909-----	270,725		
		TOTAL -----	9,412,165

SALT

Salt has been mined in Louisiana almost from the earliest days of its history and abandoned salt wells are found in many parts of the state. Salt production in the state is now confined to a few mines on the Gulf Coast, principally those at Avery, Weeks, and Jefferson Islands. The supply of salt in Louisiana's domes is practically inexhaustible. Even though Louisiana is already one of the leading salt producing states, the industry is capable of great expansion. Salt is now mined exclusively for shipment. The establishment of a chemical industry based on Louisiana's salt, lignite, and other undeveloped resources, is a matter for serious consideration. This subject is further discussed under

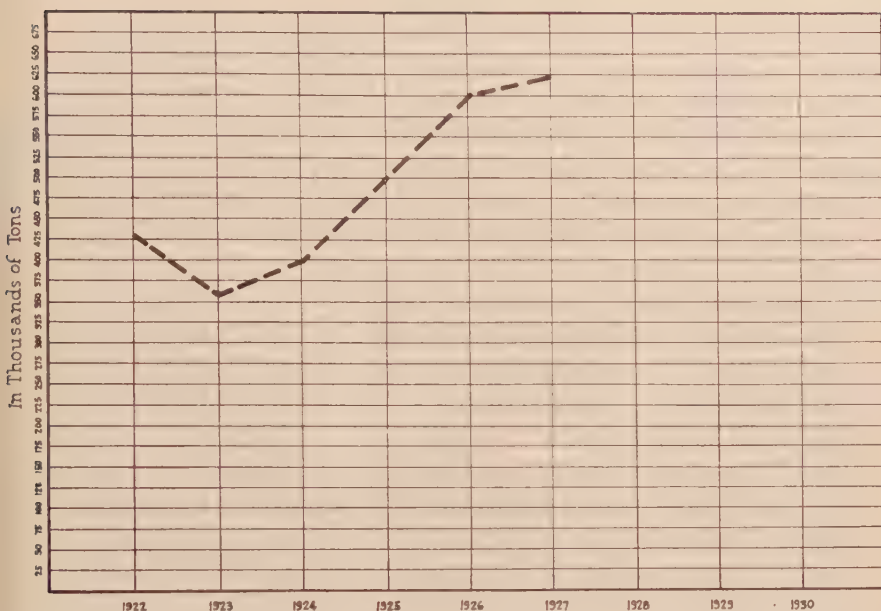


Figure 10—SALT PRODUCTION CURVE IN LOUISIANA

“Undeveloped Mineral Resources”. The following table shows that Louisiana’s salt industry during the last six years, even though far from what it should be, has been growing steadily from year to year.

LOUISIANA SALT PRODUCTION

1922	-----	435,621	tons
1923	-----	363,026	“
1924	-----	400,586	“
1925	-----	500,378	“
1926	-----	502,849	“
1927	-----	598,597	“

UNDEVELOPED MINERAL RESOURCES

Recent years have witnessed a marked southward trend in industrial activity. Mining interests, pulp mills, fertilizer plants, and many forms of industrial activity are looking to the Southland for new supplies of raw materials, cheaper sources of fuel, and relief from labor troubles caused by preponderance of labor of

foreign extraction. The Southern States with their undeveloped minerals, forest lands, available cheap fuel, and native labor are already awakening to the call of opportunity. Practically all the Southern States are preparing to compete actively for the benefits to be derived from the oncoming wave of industrial development. Practically all of them are supporting adequately financed geological surveys and industrial development boards. Louisiana is not now provided with any organized agency to meet competition of this kind. If Louisiana is to secure her share of the industrial expansion which is promised for the future, the state, like any business organization, must compete for the business.

Louisiana now supplies gas fuel for Southern Arkansas, central east and southeast Texas. Probable industrial expansion in Mississippi and the Southeastern States will encourage piping of gas into more distant industrial centers. These other Southern States are probably more generously provided by nature with a supply of the natural ores peculiar to the more highly mineralized older formations. It is natural to assume that Louisiana's younger geological formations will not yield the great variety of mineral resources found in the other states. Louisiana is provided with a fuel supply superior to any of the competing states, and with certain mineral resources capable of development. This development, however, will never be more than a dream until a geological survey of the state sets before the investor the story of Louisiana's natural mineral wealth.

Dr. Henry Mace Payne in his recent book on Undeveloped Mineral Resources of the South* indicates the possible development in Louisiana of asphalt, clay, gravel, gypsum, lignite, limestone (agricultural, chemical and building stone), marl, mineral waters, salt, sand, sulphur, and volcanic ash. To what extent these mineral resources are present in the state and to what extent they are susceptible to commercial development will

*—Published by the American Mining Congress, Washington, D. C., 1928.

never be accurately known without the reestablishment of the State Geological Survey.

The minerals division is now attempting in a small way to make up for the lack of geological information through its Clay Survey, described elsewhere in this report, and by constant effort on the part of the Shreveport office to interest possible investors in development of other mineral resources. As a result of this campaign many investigations have been started by private concerns. The erection of an experimental chemical plant for the extraction of valuable salts from oil field brines is practically assured. The development of a great chemical industry for Louisiana is far from impossible. With a practically inexhaustible source of salts in oil field brines, and in the many salt domes, an assured supply of carbon in her gas and lignites, and with cheap fuel, the manufacture of salt cake, caustic soda, hydrochloric acid, sulphuric acid and the many chemical by-products derived from electrolytic processes should make Louisiana the center of southern chemical development. The state not only offers the raw materials to the industry but, with the other states of the South, offers a growing market as well. Pulp mills, glass plants, oil refineries, sugar refineries, and other industries now import their salt cake, caustic, and chemical supplies from the North.

In Calcasieu Parish, GYPSUM has been reported in beds from 100 to 540 feet thick, 300 to 1600 feet from the surface. These beds are capable of development by shaft mining methods and, with water transportation could probably be operated commercially. Gypsum is used for fertilizer, and as a retardent in Portland cement. When calcined, it is used for plaster of Paris, wall plaster, Keene's cement, dental plaster, and plate glass polish. With other materials, it is used in making blackboard crayons, match heads, and certain paints, insecticides, relief maps, models, statuary, molds for rubber stamps and terra cotta trim, surgical casts, decorative friezes and hat blocks. In the manufacture of plaster and wall board, partition blocks, furnace and

pipe covering, tiling in storage warehouses, and laundries, where wall sweating is objectionable, gypsum plays a major part.

The LIGNITES of Louisiana (partly covered in Bulletin No. 8, Department of Conservation*) furnish one of the raw materials essential to the development of the fertilizer industry within the state. Dr. Payne estimates that the Louisiana lignites contain approximately 80 pounds of ammonium sulphate to the ton, equivalent to 65 pounds of recoverable nitrogen. In carbonization, Louisiana lignites give off a gas containing 57% free hydrogen. The manufacture of fuel briquettes from lignite is commercially impracticable due to the presence of cheaper fuels. Lignite, besides its value in the fertilizer industry may be used in the manufacture of aniline dyes, photo-chemicals, and coal-tar preparations. From the carbolic and creosote fractions are derived lysol, creoline, salicylic acid, aspirin, oil of winter-green, picric acid, phenacetin, and many dyes, chemicals, and perfumes, gas enriching oils, paraffin and asphalt pitches for roofing, insulating and waterproofing. Powdered lignite may be used for preserving eggs during hot weather. It is also used as a mixture with cane juice for filtration, its colloidal properties serving as a decolorizer and yielding a bright almost colorless filtrate. The residue from the filters may be used as fuel under evaporating pans. Powdered lignite is also used in the manufacture of hollow tiles. The lignite burns out during firing and imparts a desirable porosity to the texture of the finished tile.

Carbonized lignite is equivalent to animal charcoal as a decolorizing agent. When purified with hydrochloric acid it is superior to either animal charcoal or rice-hull carbon, and will probably compete favorably with the various vegetable carbons used in sugar manufacture. It is invaluable as a catalytic agent, when fully carbonized and treated with hydrochloric acid and diluted with ammonia, in the manufacture of carbon tetrachloride.

*—Out of print.

Lignite furnishes a source of montan wax when treated with benzol or similar solvents. Montan wax may be used in phonograph records, for impregnating woven belts, cable covering, roofing composition, adhesive greases, stove polish, insulating material, and paper sizing. When bleached to a white or pale yellow it is suitable for manufacture of candles designed to stand up under tropical temperature, and in carbon papers and crayons.

LIME in its various forms is useful in so many industries that only the major uses may be indicated in this report. Louisiana's supply of limestone, chalk, and other lime sources is not as adequate as those of neighboring states with their outcropping older formations. Some sources of commercial lime have however been developed and careful survey probably would reveal further available deposits. Coochie Broke yields a yellowish-blue sandy limestone readily quarried, but unfortunately containing quantities of pyrite nodules. At Bayou Chicot in Evangeline Parish is a dark gray limestone formerly burned for agricultural lime. A highly crystallized blue and white limestone is quarried at Winnfield in Winn Parish. This quarry is served by three railroads and with improved quarrying facilities is capable of greatly increased development. The crushing strength of the Winnfield limestone is given as 27,300 pounds, hardness 12.1, specific gravity 2.7, and loose weight (50 per cent voids) 168 pounds per cubic foot. The present plant has a capacity of 24,000 tons per month and supplies material for soil improvement, chemical lime, crushed limestone and screenings for roads, ballast, concrete, riprap for levees, and quarry waste for roads and railroads. The nearest active competing supplies are at Birmingham, Alabama, Little Rock, Arkansas, and New Braunfels, Texas. With close to 150 sugar refineries in the state, and a constantly increasing list of pulp mills, water purification plants, glass factories, and other industrial plants requiring lime, and with its strategic location, the Winnfield quarry is

recognized as one of the most important mineral deposits of the state.

South Louisiana's extensive shell reefs are fast becoming a factor in the lime industry of the South. The shell deposit on Isle des Coquilles has been proved to a depth of 3 feet over an area of 7,000 acres, an estimated reserve of 80 million cubic yards. It is only 28 miles from New Orleans and water transportation is available. These shells yield 97 per cent calcium carbonate. Builders' lime, 97 per cent pure, with 3 per cent silica, and no iron, may be manufactured from the shell deposits. At Morgan City, St. Mary Parish, on the Atchafalaya River, a similar deposit is available. It remains for more complete survey to reveal the number and actual extent of South Louisiana's shell deposits.

Lime deposits yield stone lime, quick lime, lime putty, hydrated lime and air slaked lime. Limestone is essential to the soil to correct acidity. Lime is used in building, iron ore reducing, steel making, cement manufacture, preparation of wood pulp, for water purification, in sugar refining, as chicken grit, for paint and asphalt filler, in tanning, in glass manufacture, in the oil, fat, and soap industries, in making cyanamid, for railroad ballast, road building, for sand-lime brick, in alkali works, for sheep dipping, in the composition of disinfectants, in glue making, as a food preservative, in vulcanizing rubber, for cold water paints, for saponification of oils, in medicines, in manufacture of paper from cotton linters and bagasse, as a precipitating and coagulating agent, for neutralizing acid water, in the production of ammonia, as an absorbent medium, in cleaning mixtures, for lubrication of dies in the wire industry, for bleaching in the making of high grade rag papers, as a mordant in the dyeing industry, and as a catalyzing agent.

The almost inexhaustible supplies of SALT, OIL FIELD BRINES and MINERAL WATERS in Louisiana constitute a source of raw material on which should be built up an extensive chemical industry. There are 14 known salt domes in north Louisiana. The plugs of

practically pure sodium chloride which form the cores of these salt bodies range from one-half to one mile in diameter and are at least 4,000 feet in depth. In south Louisiana there are over thirty known domes of similar size. In practically all these domes the salt may be easily mined by sinking of wells to the salt body, dissolving the salt by hot water, pumping the solution to the surface and evaporating. Several of the south Louisiana salt domes are now being mined by means of shafts.

To one not familiar with chemical industries the knowledge of the position of salt as one of the most important raw materials will come as a surprise. Sodium carbonate is produced by the ammonia soda process from sodium chloride (common salt). Sodium carbonate is used as the raw material in the manufacture of caustic soda. When salt is treated with sulphuric acid, sodium sulphate is formed with the liberation of hydrochloric acid gas. Sodium sulphate, or salt cake, is used in the manufacture of glass. The hydrochloric acid is recovered and used in other industries. Sodium silicate (water glass) is made by fusing sodium carbonate or sulphate with pure sand. In soap manufacture, the soap is washed to remove impurities, and salt is used to throw the soap out of solution. When an electric current is passed through a solution of salt, the resulting products are caustic soda, hydrogen, and chlorine. The chlorine may be compressed and shipped in cylinders, or may be absorbed in lime to form chloride of lime used as a bleaching powder and disinfectant. In the ceramic industry salt is used to produce the glaze on earthenware such as sewer pipe and pottery.

The development of chemical industry based on oil field brines has passed the experimental stage. At Midland, Michigan, and at Sand Springs, Oklahoma, successful plants are in operation. Louisiana oil field brines are capable of yielding common salt, salt cake, caustic soda, and various potassium and magnesium salts. This is particularly true of the brines from the older geologic horizons. The therapeutic properties of the brines at

Boyce in Rapides Parish have long been recognized. Before long it is expected that a health resort of a similar nature will be established near Creston in Natchitoches Parish.

In Vernon Parish, about 12 miles west of Anacoco and 4 miles east of the Sabine River, there is a deposit of chalky clay at a depth of about 100 feet, underlaid with TRIPOLI. Tripoli has a specific gravity of 2.15 to 2.63. Its porosity ranges from 45 per cent to 68 per cent, and its absorption ranges from 38 per cent to 52 per cent of water. Its grains are hard enough to scratch steel. Tripoli is used largely as an abrasive base for polishing powders and cleansers, scouring soaps and toilet articles; as a fire proof filler for safes and filing cabinets; as a heat insulating packing; as a parting sand in foundry work; as a filler for paper, cloth and rubber; as a carrier for insecticides; as a filtering agent; as a wood filler; and in refractory cements. As a filtering agent tripoli is said to remove 98 per cent to 100 per cent of the micro-organisms found in water.

VOLCANIC ASH, either loose or solid, is used in cement and as an abrasive in various polishing and cleansing compounds, in tooth powders and for insulating purposes. A deposit of volcanic ash of considerable extent and very finely grained, covering several square miles is found about eight miles southeast of Columbia, Louisiana. It will vitrify and glaze at a comparatively low temperature and is available for soft abrasive and buff compounds. The Columbia bed is supposed to vary from 5 to 25 feet in thickness. Similar deposits no doubt exist throughout the area covered by the Catahoula formation, extending in a belt across the central portion of the state.

CLAY SURVEY

In June, 1925, the Commissioner of Conservation and the President of Louisiana State University entered into an agreement whereby a cooperative clay survey and a university course in ceramics and ceramic en-

gineering could be established. Under the agreement the Department of Conservation pays all salaries and purchases all field equipment for the work, and the State University purchases all laboratory equipment and furnishes laboratory space. The ceramic engineer employed by the department serves as professor of ceramic engineering for the university.

In addition to purchasing and maintaining all field equipment, it has been found necessary for the department to furnish a considerable portion of the laboratory equipment beyond the terms of the agreement. The ceramic engineer is assisted by a Minerals Division agent attached to the Clay Survey. On several occasions his work has been supplemented by one or more other assistants in field and laboratory work. A considerable part of the laboratory work is done by student labor paid for by the Minerals Division.

The Clay Survey makes a thorough preliminary inspection of each parish, collecting samples from each outcropping clay bed that may be encountered. Wherever possible these samples are taken in road or railroad cuts, stream banks, gullies, etc. Where no natural cut brings the clay to the surface, the practice of drilling test holes is followed. Holes are sunk by means of a light portable tripod and hand auger. Borings have been made on some prospects from fifteen to fifty feet in depth. Samples are sent to the ceramic laboratory at Baton Rouge where they are tested for porosity, shrinkage, firing qualities, etc.

The parishes already prospected are Caddo, Bossier, Webster, Claiborne, De Soto, Red River, Lincoln, Union, Morehouse, Ouachita, Richland, Bienville, Jackson, Franklin, Sabine, Natchitoches, Winn, Grant, LaSalle, Caldwell, Catahoula, Vernon, Beauregard, Rapides, and parts of Calcasieu, West Feliciana, East Feliciana, and East Baton Rouge.

Tests have been run on samples from nearly all of these parishes and one bulletin has already been published, Bulletin No. 14, Clays of Louisiana (Shreveport Area). This bulletin covers Caddo, Bossier, Webster,

De Soto, and Red River Parishes. Bulletin No. 16, Clays of Louisiana (Monroe-Ruston Area), is now in the hands of the printer. The Monroe-Ruston area includes Claiborne, Union, Morehouse, Ouachita, Richland, Bienville, Lincoln, and Jackson Parishes. A third clay survey bulletin, now practically ready for publication, will include Sabine, Natchitoches, Vernon, Rapides, Grant, Winn, Caldwell, and LaSalle Parishes. Other bulletins will follow until practically all the parishes in the state have been covered by preliminary survey. A final bulletin calling attention only to the best clay deposits throughout the state will be published after a detailed survey.

A detailed search for outcrops of the Midway horizon is now under way, particular attention being paid to the areas surrounding the fourteen known interior salt domes in the north central part of the state. The Midway clays are usually buried too deeply under younger deposits to be available for the ceramic industry, but they are of exceptional value when close enough to the surface for commercial development. It is hoped that they may be found either in the interior salt dome areas or in the vicinity of the Bellevue Oil Field in Bossier Parish.

The university has set aside a building in its new plant for the Clay Survey Laboratory. This building has a floor space of 7,500 square feet and is now completely equipped for testing of clay and clay products and for the experimental manufacture of ceramic materials. The equipment includes chemical apparatus for analytic work; jaw crusher; plate pulverizer; a five-foot "wet pan"; stiff mud auger machine with a capacity of 15,000 bricks per day equipped with dies for brick, building block, or drain tile; processing cabinet for drying under automatic control of heat, moisture content, and flow of air; single stamp, hand operated dry press; a mixing and washing machine; potter's wheel; a large gas fired muffle kiln for temperatures up to 2,200 degrees; and a smaller kiln capable of reaching temperatures of 3,000 degrees.

Students are taught not only the testing of clays and the making of clay products, but also the construction and operation of ceramic plants. By this means there will have been developed a trained personnel to handle Louisiana's future clay industry which, it is hoped, will be the outgrowth of the research work now being carried on.

In addition to prospecting work, the clay survey has been of invaluable assistance to ceramic manufacturing companies already in the state through its service in testing their clay samples and products. As a result of the survey's efforts three new brick and tile plants have been established during the last two years. It is hoped that within a few years Louisiana will have many ceramic plants within her own boundaries manufacturing paving brick, sewer pipe, roofing tile, building block and pottery.

Up to April 1, 1928, the Clay Survey had drilled 2,450 test holes, collected 2,375 clay samples, tested 2,710 clay samples, and had covered 23,670 square miles in its preliminary survey.

CONSERVATION ACTIVITIES

During the period covered by this report the gas control system in effect in the Monroe District has been extended to cover the greater part of the gas producing area of northwest Louisiana. In 1921 and 1922 the first inroads were made on gas waste in Monroe. In 1923 and 1924, repair of faulty wells and elimination of fraudulent production and metering of gas in Monroe took up all the attention of the division. In 1925 and 1926 the system of recording gas information and controlling gas production under state law was fully applied in that area. In the meanwhile old and new gas fields in northwest Louisiana, most of them presenting much more complicated drilling and production problems than the Monroe area, were not watched as closely as the Monroe field itself. In 1927, with Monroe field properly organized, attention could be turned to

the Shreveport gas fields. A competent chart clerk was installed in the Shreveport office and a trained gas inspector transferred from Monroe. Meter charts were called for and gaging of wells by the Division was substituted for company gages. Companies have been urged to call for Division inspectors when bringing in wells. In practically all cases where twenty-four hours' notice has been given, an inspector has reached the well in time to make the official gage when the well first came in. This practice has eliminated to a certain extent the unnecessary blowing of wells for gaging, and the acceptance of company gages for official records. The practice of sealing in orifice plates still remains to be extended to the Shreveport area.

For the first time since the beginning of gas development in northwest Louisiana, the minerals division is able to compile reasonably accurate data on the fields of the area. This work should be extended as much as possible. Elm Grove and the De Soto-Red River Gas Fields remain to be studied. The practice of using unmetered gas in drilling operations should be checked. The increasing value of gas and the possibility of serious shortage in the Shreveport area call for strict application of conservation measures.

During 1927 increased activity in cleaning up old wells that needed attention has been noted. One case in particular is worthy of mention. For several years the Minerals Division has attempted to secure final abandonment of three old wells in the bed of Lake Bisteneau, near Ringgold. These wells were all making considerable gas and a great volume of salt water. All efforts to secure final abandonment were blocked until in 1927 the department finally notified the lease holders that repairs must be made within a reasonable time or the wells would be cured by the department at the expense of the leaseholders. An effort was made to bring influence enough on the Commissioner to thwart the purpose of the Minerals Division, but the Commissioner gave his full support to the Division. Two of the wells were taken over and abandoned under the direction of the

department. The third well was left open to furnish fuel for a drilling well on the same lease. This last well will be closed in permanently in the near future.

A similar case exists in Union Parish, where a single old well through its discharge of salt water is estimated to have destroyed \$10,000 worth of timber. The company that drilled the well capped it and left it in good condition three times. On each occasion it was opened up by parties unknown, and on the third occasion, dynamited. Negotiations are now under way to wipe out this nuisance of long standing.

A third case, in the north central part of the state has been handled differently. An old well has been making considerable gas and salt water for years. The Minerals Division found on investigation that the hot waters from the well possessed therapeutic value in the treatment of some skin affections. Negotiations are now under way for the establishment of a health resort similar to that at Boyce. In addition to the proposed baths and resort, through the efforts of the Minerals Division, a chemical experimental plant is to be erected, from which it is hoped that a new industry may develop,—the extraction of valuable salts from oil-field brines.

The increased activity in south Louisiana has encouraged the Division to detail an agent of long experience in the oil industry to the Gulf Coast area. Prior to 1927 the approved practice of cementing casing was practically neglected in the Coastal Area. So successful have this agent's efforts been that where cementing was unusual in the past, it is now the accepted practice. Our agent in the Lake Charles area reports that he has been able to secure excellent cooperation on the part of the operators with whom he comes in contact.

Prior to 1927 the Minerals Division had an agent stationed in Mansfield, De Soto Parish, and an agent at Haynesville, Claiborne Parish. These agents were available only for work in their own districts. The Mansfield agency was discontinued early in 1927 and the work has since been handled out of the Shreveport office. The Haynesville office will probably be closed in

the near future. The consolidation of these two agencies with the central office will enable the division to give better and more prompt attention to all of the northwest Louisiana area. Delay in getting an inspector on the job means loss in labor costs to the operators the minerals division has practically eliminated all complaints of this kind and inspectors are almost always available on twenty-four hours' notice, or less.

Extension of south Louisiana activity to the eastern parishes has caused considerable difficulty and may necessitate the placing of an inspector in that area. If the new discoveries at McElroy and Bayou Bouillon are the forerunner of additional salt dome production in the southeast section of the state, and if the gas showing near Houma proves out, an inspector for the area will be almost indispensable.

The practice of cooperation among the operators has been encouraged wherever possible. Several very successful meetings have taken place at Shreveport and important conservation problems have been thrashed out in round-table discussion. Even where the final results have not been all that might be desired, the meetings have at least furthered the cause of conservation by convincing the operators that the problems of the Division are their own problems as well. With few exceptions the operators, large and small, have earned the commendation of the division for willingness to enter into frank discussion of difficulties and earnest effort to keep within the law.

Pollution problems during the past two years have been many and varied. The principal difficulty encountered by the Minerals Division in this connection is the absolute lack of topographical data throughout the state. Pollution problems can only be intelligently handled when accurate information on drainage is available. Refinery wastes wander over the usual flat lands through various small streams and work their harm far from the source of the trouble. It frequently takes days of search to trace a pollution effect back to its source. With the growth of the pulp industry and the possible introduc-

tion of chemical industries in north Louisiana topographic survey becomes an even more important item in conservation work.

During 1927 the office of the Minerals Division has become an information bureau on subjects affecting the mineral resources of the state, not only in connection with the oil and gas industry, but with all phases of industrial development which might help to bring to Louisiana new industries, or further advance industries already in operation. Letters of inquiry have been received from all parts of the United States, from Canada, and from Germany. The salt dome map published by the Minerals Division has had a distribution as wide as the inquiries received. Applicants for information on subjects ranging from geophysical exploration for oil to deposits of clay suitable for making beauty preparations have been given the required information. City officials and engineers seeking data on the possibility of supplying natural gas for their communities have sought and found their data in the Shreveport office. Logs of wells, gas measurement tables, salt dome maps, parish maps, oil and gas field maps, clay and mineral resource bulletins, structure maps, advice on possible development of local mineral deposits, oil and gas well data, not of a confidential nature, are constantly emanating from the office of the division. Besides the direct benefit accruing to the inquirer, this broadcasting of information furnishes one of the best mediums of advertising the natural advantages of the state.

The Minerals Division takes special pride in the development of the spirit of cooperation that has grown so rapidly during 1927. Cooperation with oil and gas operators is now an assured fact. The Division, long looked on as a meddler in the oil and gas business, has become the friend and advisor of the operator and the landowner alike. Close cooperation has been established with the Conservation Branch of the United States Geological Survey which has charge of mineral development of lands under Federal ownership. With the Forestry, Wild Life, Fisheries and Enforcement Divisions of the

Department, cooperative effort has worked to mutual advantage.

The Forestry Division, having no agent in the Shreveport area has found in the Shreveport office a medium for the furtherance of forestry projects. The Division of Fisheries is working with the Minerals Division in the establishment at Shreveport of an analytical laboratory in which the chemical features of pollution problems may be worked out. This laboratory will save expense now borne by both Divisions in securing chemical analysis, and will assure prompt and efficient service in the determination of the chemical character of polluting agents.

CONSERVATION LAWS AND REGULATIONS

The experience of the past few years indicates several changes in existing legislation that would make for more efficient conservation. The most important of these items is the question of conservation of gas produced with oil. The present law, designed to curb gas waste from oil wells is so worded that the more important sources of waste are unrestrained. The law provides that no operator may waste more gas at three cents per thousand cubic feet than the market value of the oil produced from the same well. During the latter part of 1927, a number of the deep wells in the Pine Island Field in Caddo Parish were blowing into the air for over a month a total of 30 million to 40 million cubic feet of gas per day. Each of these wells was making enough oil to overcome the prohibition of waste of gas under the law, and the Department was unable to prevent the tremendous waste. The operators involved were called together in an effort to curb the waste and an agreement was reached under which a definite back pressure was to be held on all wells in the field. One or two operators disregarded the agreement and the others, to protect themselves, followed suit, a course in which they were protected by the law. The subsequent waste of gas meant not only the loss of the gas itself, but the

loss also of thousands of gallons of natural gas gasoline which could have been extracted from it. More important even than the loss of gas and gasoline was the loss in lifting power which naturally followed the blowing off of the gas, and the loss in ultimate recovery of oil caused by water encroachment which naturally followed close on the reduction of rock pressure. The field, opened with great promise and rapidly declined long before the promise had reached fulfillment. That this particular feature of conservation law should be revised is certain. The increasing value of gas in Louisiana has already made the statute value, 3 cents per thousand feet, obsolete. That any law should so operate as to permit oil producers to blow millions of feet of natural gas into the air is unnecessary. Some legislative measures should be taken at once to correct the evil. That this fact is recognized by leaders of the industry is evidenced by the effort of the great producers' associations, the American Petroleum Institute, the Mid-Continent Oil and Gas Association, and the Government's Federal Oil Conservation Board to eradicate this source of waste. These great organizations have recognized in the waste of gas in the production of oil, the greatest evil in the industry. That this matter should receive immediate attention in Louisiana is indicated in the reported results of a recent discovery in the Cotton Valley Field of Webster Parish. A well reported to have opened up a new deep sand has been estimated as capable of making 3,000 barrels of 44° B oil and 15 million cubic feet of gas per day. At 3 cents per thousand cubic feet, the gas is worth \$450.00. At \$1.46 per barrel, the oil is worth \$4,380. Under the present law the operator may blow this great volume of gas into the air. It is recommended that the existing law be so changed as to remedy this glaring defect, and that the statute value of gas, provided such a value is retained in the law, be raised from 3 cents to 6 cents. Since the original law was enacted in 1924 the price of gas at the well has risen in many new contracts to 4 cents and better. It is an accepted fact that the price will continue

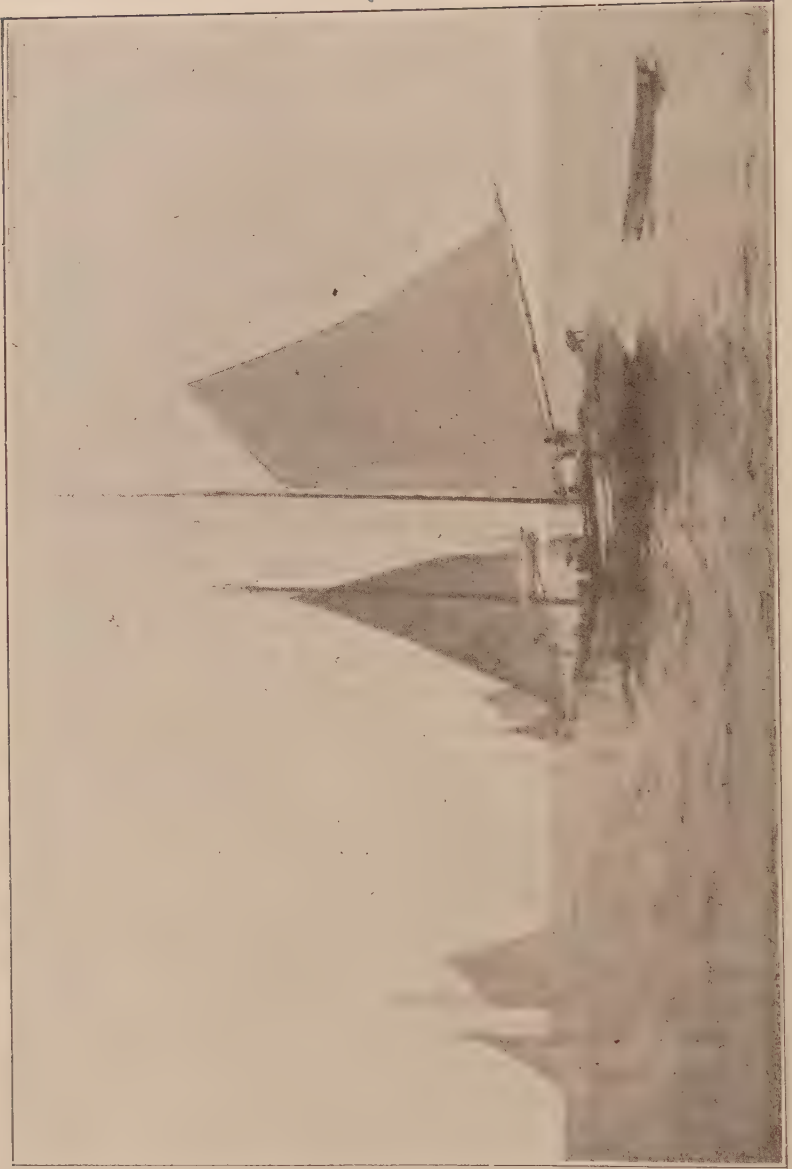
to rise as new pipe lines furnish further markets. Just what form of statute should be adopted to prevent a recurrence of the Pine Island difficulty is a matter to be settled by conference. It is the intention of the Minerals Division to call a meeting of the operators prior to the next session of the legislature in order that the technical problems involved may be worked out.

The conservation laws now provide that the state on five days' notice may take over a wild or uncontrolled well and cause it to be repaired at the expense of the owner. The cost of repairs becomes a lien on the property of the well owner. It has happened in the past and it may happen in the future, that the owner of the well may not own property of sufficient value to cover the cost of repairs. To provide against this contingency a bond of \$5,000 should be posted before the drilling of a well begins. A similar bond is required on all wells drilled on property under Federal supervision, and in other states. It would serve as a protection for the interests of the landowner, the State, and the legitimate operator, against the carelessness of the irresponsible operator. The addition of the bond feature to the law was recommended in the 7th Biennial Report. Act 250 of 1920, which covers this phase of conservation has been attacked on the ground that the title was not sufficiently broad. The question arose, prior to the period covered in this report, in regard to the taking over of any well in bad condition and the making of the cost of repairs a lien on the property of the well owner. It was contended that the law covered only "wild" or "uncontrolled" wells. Though this amounts to nothing more than an absurd technicality, the law should so read that any faulty well doing or capable of doing damage to adjoining property, or injuring or capable of injuring the interests of the state by pollution or premature exhaustion of the mineral resources, could be taken over by the Department of Conservation and be properly repaired or abandoned by contract or by the Department itself at the expense of any operator who fails to make such repairs of his own volition. This change was recom-

mended in the 7th Biennial Report. In cases of emergency it should be possible for the Department to take over a dangerous well without giving the five days' notice now required by law.

The interests of the state in the abandonment of wells would be protected under the present law provided the Department employed a force sufficient to supervise carefully each abandonment. Casing pullers, however, work with light and frequently with inadequate equipment. Consequent delays and break-downs make it necessary at times, for department inspectors to make five or six trips to the scene of the abandonment before the work is finally finished. It is practically impossible for the state to employ a force large enough to devote more than one or two trips to each abandonment. It is recommended that casing pullers be licensed, with revocation of the license for cause in the hands of the Department. Licenses should not be issued to casing pullers until they are properly equipped to carry out the requirements of the present law promptly and efficiently. Without the assurance of proper abandonment there is no assurance of protection of oil and gas sands from infiltration of water, or protection of fresh water sands and surface waters from pollution.

Finally, the conservation laws now on the statute books are too many and too long. They can probably be interpreted intelligently by a lawyer thoroughly familiar with the oil and gas industry, but to the oil and gas operator with no legal training, or to the average lawyer with no gas and oil experience, they are too hopelessly involved, too full of repetitions, to permit of full and intelligent interpretation. The many oil, gas, and pollution laws, should be simplified and reenacted in one law setting forth conservation requirements in unmistakable terms.



Schooners, dredging oysters from Cabbage Reef, St. Bernard Parish

Report of the Division of Oysters

JAMES N. McCONNELL, Surveyor and Director

In reviewing the activities of this department and the development of the Louisiana oyster industry over the past two years, two severe production losses must be taken into consideration.

In September of 1926 one of our September storms of cyclonic proportions traversed the southern part of the State, coming up from the Gulf through the Lafourche and Terrebonne sections. This disturbance, which destroyed an enormous area of bedding grounds, has caused the loss of thousands of barrels of oysters.

Secondly, the effect of the memorable flood of 1927 was felt over three large areas.

The enormous discharge of fresh water through the Atchafalaya Basin resulted in the complete destruction of the oysters in Four League Bay, Sister Lake, Bay Junop, Vermilion Bay, and the reefs at Point au Fer and Marsh Island. From this section no marketable oysters were available this winter.

In the Barataria Bay section, fresh water from the Junior Crevasse caused a loss in Wilkerson Bay and Bayou, Lake Washington and Bayou Colas, but the damage was relatively small.

The Caernarvon crevasse and Bohemia spillway east of the Mississippi River, on the other hand, has caused great damage. It is estimated that a loss in excess of one-half of the oyster crop of 1927 has been sustained by this section as the immediate result of the influx of fresh water from these sources. However, whereas the immediate effect of the excessive flood water discharge has represented a severe loss to the Louisiana Oyster Industry, the situation is not without its compensating features.

In the Atchafalaya country the bivalves are now coming back very nicely; so that the quicker growing ones will be ready for the market about the first of next year.

In Barataria Bay the benefits derived from the Junior crevasse much more than compensate what damage was incurred at the time of the break. A great part of this section is normally almost non-productive because of the high salinity of the water which is unfavorable to the oyster spat and because of the abundance of the periwinkle, the natural enemy of the oyster. The flow of fresh water into Barataria Bay lowered the salt content allowing oyster spat to catch and attain a reasonable degree of maturity before the conditions again became unfavorable. The fresh water, moreover, killed off the periwinkle, which is slower in growing back than the oyster on which it preys. The net result is that reefs in Barataria Bay, which have been barren for several years, show a heavy growth of young oysters, which will be ready for the market about the first of 1929.

Barataria Bay oysters are considered the world's finest. They are known by the market designation of "cock" oyster, which term is applied to bivalves with wine colored inner face shells. As long as the oysters last in Barataria Bay the demand for them is such that counter oysters from other localities are marketed with difficulty. The supply of oysters from most parts of this bay, however, will be exhausted after a few months, as the customary high salinity inhibits their propagation.

East of the river investigation reveals a very thick growth of young oysters in the flood affected areas. The shells of those oysters killed by the fresh water are serving as a bed for this new growth. Furthermore the old, depleted and dead reefs in the outside waters between Point Chico and Point Comfort, from which no oysters have been taken in the history of the Conservation Department, are now completely covered with young growth. This condition of heavy new growth is also extant in Nigger Lake, Quarantine Bay, Calligo Bay, American Bay and along all other portions of the coast affected by the crevasse and spillway.

Thus it happens that while the flood was responsible for the loss of approximately one-third of the current



HAND TONGING OFF NATURAL OYSTER REEFS

crop, in return it effected conditions which give promise of a banner crop for the season 1929-30.

Although the receipts of this division have fallen off somewhat as the immediate result of Act 258 of 1926, which prohibited the shipping out of the State of oysters in the shell, nevertheless, those conversant with conditions surrounding the Louisiana oyster industry feel that the untimely benefit to be derived from this law will far more than compensate for the temporary let-down. This let-down in receipts and failure to secure a successful enforcement of the law has been due to the pendency of litigation in the United States Courts which has tied the hands of the department. This litigation won by us in the lower Court is now on appeal to the Supreme Court of the United States where it is hoped and believed the matter will soon be disposed of, permitting the department of function normally in the enforcement of the law.

It is the concensus of opinion among Louisiana packers and fishermen that when this law is fully enforced, concerns operating in adjoining states will move into Louisiana and assist in building up the oyster industry here.

Because of the marked drop in the receipts for resale and shipping licenses during the year 1927, we feel that mention should be made that this is accounted for by the fact that prior to 1927 these licenses were handled by the accounting division under a different classification, for which now the inland fisheries receives the credit instead of the oyster division.

In spite of the handicaps outlined above, the following statistics will serve to show a gratifying development of the Louisiana oyster industry over the past two years.

Revenue Received

Leases

1926	-----	\$14,197.89
1927	-----	24,119.55
		-----\$38,317.44

Privilege Tax

1926	-----	\$19,447.10
1927	-----	22,266.29
		-----\$41,713.39

Tonnage License

1926	-----	\$ 2,586.50
1927	-----	1,798.50
		-----\$ 4,385.00

Canning Factories

1926	-----	\$ 100.00
1927	-----	300.00
		-----\$ 400.00

Resale and Shipping

1926	-----	\$ 8,818.00
1927	-----	1,520.00
		-----\$10,338.00

Registration Fees

1926	-----	\$ 25.00
1927	-----	17.00
		-----\$ 42.00

Dredge or Scraper License

1926	-----	\$ 7,700.00
1927	-----	5,581.50
		-----\$13,281.50



THE INCOMPARABLE LOUISIANA OYSTER

Recapitulation

	1926	1927
Bedding Ground Rent.....	\$11,197.89	\$24,119.55
Privilege Tax.....	19,447.10	22,266.29
Tonnage License.....	2,586.50	1,798.50
Canning Factories.....	100.00	300.00
Resale and Shipping.....	8,818.00	1,520.00
Registration Fees.....	25.00	17.00
Dredge or Scraper License.....	7,700.00	5,581.50
Total	\$52,874.49	\$55,602.84
Increase, 1927.....		\$ 2,728.35

The following tabulation gives the total number of leases as of December 31, 1927, the total acreage under lease and the total acreage adaptable to the profitable cultivation of oysters:

St. Bernard Parish

Total number of leases-----	90
Number of acres under lease Dec. 31, 1927-----	4,963
Number of acres suited to oyster culture-----	146,500

Plaquemines Parish

Total number of leases-----	433
Number of acres under lease Dec. 31, 1927-----	2,533
Number of acres suited to oyster culture-----	171,000

Jefferson Parish

Total number of leases-----	110
Number of acres under lease Dec. 31, 1927-----	1,694
Number of acres suited to oyster culture-----	28,000

Lafourche Parish

Total number of leases-----	133
Number of acres under lease Dec. 31, 1927-----	1,395
Number of acres suited to oyster culture-----	3,000

Terrebonne Parish

Total number of leases-----	1,013
Number of acres under lease Dec. 31, 1927-----	10,119
Number of acres suited to oyster culture-----	122,000

Iberia Parish

Total number of leases-----	17
Number of acres under lease Dec. 31, 1927-----	911
Number of acres suited to oyster culture-----	4,000

Vermilion Parish

Total number of leases-----	12
Number of acres under lease Dec. 31, 1927-----	723
Number of acres suited to oyster culture-----	2,000

Cameron Parish

Total number of leases-----	10
Number of acres under lease Dec. 31, 1927-----	108
Number of acres suited to oyster culture-----	500

Summary of Leased Bottoms

	No. of Leases	No. of Acres
St. Bernard-----	90	4,963
Plaquemines-----	433	2,533
Jefferson-----	110	1,694
Lafourche-----	133	1,395
Terrebonne-----	1,013	10,119
Iberia-----	17	911
Vermilion-----	12	723
Cameron-----	10	108
Total-----	1,818	22,446



The oyster lugger and its crew is a characteristic sight of the Louisiana coast line

Oyster Crops

1926	-----	2,192,136 Bushels
1927	-----	2, 464,226 Bushels

Oyster bedding ground leases registered from January, 1922, to January, 1928:

1922	-----	303 Leases
1923	-----	158 Leases
1924	-----	343 Leases
1925	-----	272 Leases
1926	-----	141 Leases
1927	-----	423 Leases

SAND GRAVEL AND SHELLS

The work in connection with the sand, gravel and shell contracts was consolidated with the oyster division on March 1, 1927.

The policy of this division since that time has been to get away from long term and exclusive contracts,

as much as practical and to issue yearly permits in their place. Only in special cases where large investments require protection, is it the policy of this division to issue exclusive contracts.

The financial statement covering the royalties paid on sand, gravel and shells during the years of 1926 and 1927 follows:

1926	-----	\$32,655.86
1927	-----	43,701.46

\$43,701.46
32,655.86

Increase, 1927----\$11,045.60



Report of Engineering

JAMES N. McCONNELL, Surveyor

Bayou De Siard

Dam No. 3 at the junction of Bayou De Siard and Bayou Bartholomew is almost completed. This dam is being built by the Parish of Ouachita as a cost of approximately \$20,000. It will be used as part of their highway system, replacing a bridge at that point.

Dam No. 2 at Black Bayou has been completed by the Parish of Ouachita and is also used as part of their road system.

The contract for the building of Dam No. 1 is expected to be let sometime during March. This dam is being built by the City of Monroe as part of their waterworks improvement project. This project will cost approximately \$110,000 which includes a large pumping station, so that the Bayou De Siard water can be used by the City of Monroe at any time when the water in the Ouachita River becomes too salty or otherwise contaminated for local consumption. Upon the completion of this last dam Ouachita Parish will have in Bayou

De Siard one of the finest natural fish hatcheries and preserves in America.

Black, Clear and Saline Lakes

A survey was completed during the summer of 1926 of Black, Clear and Saline Lakes, and an estimate given of \$40,441, the cost of a reinforced concrete dam to be located at a point on Saline Bayou just below Bayou Bourbeaux.

This would assure several feet of water at all times in Black, Clear and Saline Lakes and as a result, would make of this spot one of the most ideal fishing and hunting centers in the State.

This survey with its accompanying maps and estimate cost the Department of Conservation \$2,058.31.

It is now left with the Parishes interested or the State of Louisiana to raise the money to complete this project.

Marsh Island

During October, 1927, a survey was made locating and marking all the school sections in Marsh Island, at a cost of \$459.00 to this Department.

Lake Bruin Fish Hatchery

A survey was completed during November, 1927, of the Lake Bruin Fish Hatchery, giving 40 acres to this Department to be used for fish cultivation. This survey was made at a cost of \$150.00.



Settling basins in oil field designed to prevent oil waste escaping and polluting fishing streams

Report of the Division of Fisheries

PERCY VIOSCA, JR., Director

Delegated to this Division are all activities pertaining to the regulation of our fresh and salt water fisheries, oysters excepted, a study of their conservation problems and the gathering of biological and statistical data so necessary if we wish to develop these fisheries to their fullest extent without danger of depletion. Included in their scope are some of the most valuable natural resources of the State of Louisiana, the fresh water fisheries including not only important game and commercial species of fish, but also frogs and some less important resources, such as river shrimp and turtles, and the salt water fisheries including shrimp, diamond-back terrapin, crabs and some minor sea products in addition to the various species of fish.

This report covers our activities for the two calendar years ending December 31, 1926 and December 31, 1927, respectively. During this period the directorship of this Division has changed hands, the present director, formerly biologist of the department, taking office on March 2, 1927, succeeding E. A. Tulian, former director.

FRESH WATER FISHERIES

The fresh water fisheries may be divided into two main divisions, comprising respectively game and commercial species. Our game fish, the sale of which is prohibited by law, comprise the black basses, commonly called green trout; the white bass, commonly called barfish; the yellow bass, commonly called striped bass; the crappies, commonly called white or speckled perch; and several species of sunfish, commonly called perch or bream.

Our commercial fresh water fisheries, the sale of which is permitted under certain legal restrictions, comprise three species of buffalofish, several species of catfishes, the fresh water drum, locally called gaspergou,

the paddlefish or spoonbill cat, two species of bull-frogs, and mussel shells. There are also several minor fisheries, the catch and sale of which is not restricted, namely, fresh water or river shrimp, fresh water turtles and terrapin, the German carp and the carp sucker. The three species of gars and the bowfin (grinnet), which are looked upon as outlaws, find a limited market, or are consumed locally to some extent.

Fresh Water Fish Revenues

These fisheries are maintained and protected by means of revenues derived from the sale of licenses to fishermen and dealers. Table 1 shows all revenues derived from these sources. The anglers' licenses, now required for a certain class of sport fishermen, in effect since July 28, 1926, brought in a revenue of only \$476 during 1926 and \$7,433 in 1927. The importance of the so-called sport fishing in Louisiana is proportionately far beyond the revenues derived from licenses which must be spent in its protection. It is recommended that the law be re-written so that all persons indulging in fishing as a sport, be compelled to pay a license irrespective of the kind of tackle used; whereas, only a few minor exemptions should be permitted so that citizens hard pressed for food can obtain wholesome fish of certain species without the payment of this license.

The revenues received by this Department from commercial fresh water fish amounted to \$23,486 in 1926 and \$22,593 in 1927, these revenues being derived from licenses for retailers, shippers, vessels, nets, and seines. The present licensing system is cumbersome, and works a hardship on dealers and fishermen. It is believed that a severance tax, payable at the first sale, would be a more equitable means of collecting these revenues so that each dealer will pay in proportion to his volume of business. All other licenses could then be made very nominal and serve in reality as registration fees.

A glance at Table 1, will show that the total of all fresh water commercial fish revenues decreased nearly

Table 1

FRESH WATER FISHERIES REVENUES

Source	1926		1927	
	Number	Amount	Number	Amount
Local Retailers' Licenses-----	300	\$ 1,500	390	\$ 1,950
Shipping Licenses-----	88	8,850	95	9,800
Fish Buying Vessel Licenses--	40	840	61	1,270
Seine Licenses-----	211	9,800	121	6,350
Trammel Net Licenses-----	16	400	32	800
Hoopnet Licenses-----	879	2,096	1,072	2,423
Total Commercial Fish Revenues -----	1,534	\$ 23,486	1,771	\$ 22,593
Frog Dealers' Licenses:-----	6	255	77	2,695
Anglers' Licenses-----	384	476	7,162	7,433
GRAND TOTAL-----	1,924	\$ 24,217	9,010	\$ 32,721

\$900 during 1927 over 1926. This is due to the fact that seining licenses showed a decided decline, although all other fresh water fish revenues showed at least some increase. The decline in seining licenses is due chiefly to the flood disaster which made it necessary for fishermen adversely affected to substitute cheaper fishing tackle such as hoopnets and trammel nets for seines, or to fish with trot lines, for which no license is required. The results are evident from a study of Table 2 where it can be seen that trot line species, such as catfish and gaspergou (fresh water drum), were taken in larger numbers, whereas the take of buffalofish decreased somewhat, in spite of the greater number in our waters and the tremendous individual catches after the flood receded.

Total fresh water fish license revenues for the combined years of 1926 and 1927 were \$56, 871. During the preceding two years, 1924 and 1925, these revenues amounted to \$40,530, a total increase of \$16,325, or an average increase of \$8,162 during each of the past two years.



During the flood our farm lands became fish farms and resulted in a tremendous increase in fish life

Frogs

Regulation of the frog industry, consisting almost entirely of two species of bullfrogs, and the collection of statistics pertaining to this industry, began late in 1926 as decreed by the last session of the legislature in Act 134 of 1926. The statistics on hand, Table 2, although perhaps incomplete because of difficulties encountered in getting a new law properly enforced, have shown that the frog industry is much larger than might have been expected. It is believed that fully a million bullfrogs have been taken in Louisiana during 1927, and because of excellent breeding conditions during the past two years, this high output should be maintained or bettered during 1928.

The Flood and Our Fisheries

Reorganized in April, 1927, at a time when the greatest flood in the history of the Nation was already



Catahoula Lake, LaSalle parish during a drought. A small dam would raise the water level and perpetuate the fish during such adverse periods

descending upon our State, this Division immediately set as its main task the gathering of all available data showing the relation of the floods to our various fisheries. At that time it had already been predicted that the flood would be the greatest in the history of Louisiana, and with a biological study of the 1922 flood before us, it could be predicted that the fiscal year following the recession of the 1927 flood would easily be our greatest fishing year as a direct result of the flood.

The phenomenal catches of salt and fresh water fish already reported from all sections of the State after the flood receded, amply bore out our predictions and expectations. In fact a study of our statistics of commercial species over several years, combined with field observations of both game and commercial species, has also indicated that the yield of our fisheries, oysters

excepted, during the latter part of 1927, was as phenomenal as the flood itself and in direct proportion to its magnitude. In fact conditions pertaining to fish life stood out in quite a contrast when compared to the drouth years of 1924 and 1925, when the fish in many streams became thin or scarce, and a shortage of food and young was noted everywhere.

While it is true that agriculture and industry have suffered greatly from the recent rampage of the Mississippi, if we try to overlook our losses and view the flood as an attempt by nature to return Louisiana to her virgin condition, we can more easily appreciate the resulting benefits to all of our fisheries, and the reasons for this phenomenal increase of our fish and other aquatic life.

This increase was due to a tremendous temporary increase in the water area of Louisiana caused by crevasses, the floods virtually creating conditions in the formerly dried areas, similar to those in a fish hatchery, but this hatchery, instead of being only a few acres in extent, covered during the 1927 flood, some six million acres in Louisiana alone, or about one-fifth the total area of the State. Since all Louisiana streams are interconnected, the benefits of this gigantic fish hatchery and brood pond are state-wide. Spreading over our swamps and farm lands, the fish, formerly confined to our streams, propagated in inconceivable numbers and grew rapidly upon the abundant natural food supply, as well as upon the dead animal and plant life destroyed by the floods, great quantities of organic matter, formerly inaccessible as food for aquatic organisms, thus being made available to the fish as they spread over the flooded districts. To this was added the immense amount of organic matter in the river water itself, a result of the scouring effect of torrential rains, and their solvent action on organic matters or other fertilizer elements over the entire Mississippi Valley. After the water deposits its coarser sediments in slack water areas, this organic matter becomes immediately converted into great quantities of minute plants and animals and subsequently into larger plants, fresh water shrimp, cray-

Table 2

STATISTICS OF FRESH WATER FISHERIES

The number of pounds and severance value* of each species of commercial fresh water fish and frogs taken in Louisiana for the years 1926 and 1927.

Species	1926		1927	
	Pounds	Value	Pounds	Value
Buffalofish -----	4,547,628	\$ 260,119	4,012,476	\$ 220,686
Catfish -----	1,975,636	105,538	2,828,278	160,696
Gaspergou -----	960,204	28,806	1,190,384	35,711
Paddlefish (Spoonbill Cat)----	36,886	4,426	50,205	7,225
Total Fish-----	7,520,354	\$ 338,890	8,081,343	\$ 424,319
Frogs -----	44,457	6,668	837,735	125,661
GRAND TOTAL-----	7,564,811	\$ 345,558	8,919,078	\$ 549,980

*Value at the fishing grounds: To this should be added the value of the product to the dealers and retailers which double and triple the valuation figures enumerated in the above table.

fish, minnows, worms, insects, and other live food organisms, which are the fundamental sources of food supply of our fresh and salt water food fishes, frogs, turtles, alligators, shrimp, crabs, oysters, and also our fur-bearing animals, ducks and other water birds. These in the aggregate, constitute perhaps the densest and richest wild fauna in the world, considered both from its commercial and recreational values even under ordinary circumstances.

The chief lesson we can learn from the rapid recovery of our aquatic life after a drouth and the overstocking of our streams with fish after a few months of conditions very favorable to them, is that our future problems of fish conservation are more of an engineering rather than of a legislative nature, and that these problems can be dove-tailed in with flood control in such a way that our fish supply may be permanently increased, thus insuring the nation a more balanced diet

by supplementing our farm products with an increased supply of wholesome aquatic foods.

The above subject, which was given much thought and study, was summarized in a paper entitled "Flood Control in the Mississippi Valley in its Relation to Louisiana Fisheries". This was read before the American Fisheries Society at Hartford, Conn., on August 8, 1927, and reprints were sent to Federal, State and City officials throughout the country who are interested in the vast and timely subject of flood control.

In view of the millions of idle acres of farm lands in this State today and the continued surplus production of our major crops, and after considering on the other hand the almost insatiable demand for fisheries and their products in the interior States, the best use to which we could put our great lowland basins would be to dedicate them to the floods, fish and higher aquatic wild life. The construction of proper spillways making use of these great basins would be the greatest move in fish conservation this country has ever made. Since the larger aquatic organisms take several years to reach maturity, if spillways on the Mississippi River were permanently located, their beneficial effects would be cumulative, and the value of our fisheries could be increased manifold thereby, and more than pay the bill for flood control. Since public hunting and trapping grounds are fast becoming a thing of the past, we could maintain forever in Louisiana for public use, the finest hunting, fishing and trapping grounds in the world, always easily accessible to the population of a large metropolitan district and a dense rural population, as well as being an attractive virgin territory available to sportsmen and naturalists of the entire country and possessing an intrinsic beauty so unique as to be a drawing card for tourists from everywhere.

There would be several other decided benefits brought about by regular flooding of our great lowland basins, among them moderation of climate, better health conditions and more productive farm lands, the latter due to the maintenance of a higher ground water

level for growing crops, and proximity of water for irrigation of adjacent agricultural lands in time of drouth, which water in itself is sufficiently rich in fertilizer elements to make other artificial fertilization unnecessary.

With these valued uses, added to the fact that they will be continually growing valuable forests at the same time, while always acting as flood insurance for the industrial centers and agricultural regions, the term waste lands applied by the ignorant to these great areas, would no longer have the slightest grounds for justification.

Our main hope now is that national patriotism will overpower sectionalism, and that partisan politics will not prevent Louisiana from overcoming her main drawback, the ever-present menace of floods, at the same time assuring her her rightful place in providing for the Nation a wealth of aquatic natural resources such as cannot be approached by any other region of the country, thus converting our flood regions into great revenue producers at all times.

Fish Culture in Louisiana

There are two fish hatcheries at present operated in the State. A hatchery for buffalofish, located at Plaquemine, is operated jointly by the Department of Conservation and the United States Bureau of Fisheries. Here, the eggs are removed from the parents by a process technically known as stripping, these parents having been taken on the spawning beds during the breeding season. The eggs are allowed to hatch in running water in batteries of jars which have been demonstrated to be suitable for this purpose. It takes an average of about fifteen days for the young buffalofish to be fully formed and free to swim about, when they are ready for planting. At this stage, when they are called "fry", they are planted in various sections of the State in waters suitable for their development.

The Beechwood fish hatchery, a game fish culture station located near Forest Hill south of Alexandria, is operated solely by this department. At this hatch-



A bayou polluted by paper mill wastes. Note the scum caused by decomposition of wastes

ery attention heretofore has been paid largely to the cultivation of four species of our best native game fish, namely: the green trout or black bass, the goggle-eye perch or warmouth bass; and two large species of sunfish, commonly called bream or perch. Ponds are at present being prepared for the cultivation of the recently discovered Louisiana small-mouthed black bass which has never heretofore been bred in captivity.

In distributing game fish from this hatchery, special attention is paid to those waters which have been depleted for some reason or other. Since private fish culture would be of great service in maintaining and increasing our supply of fish, the Department of Conservation is also encouraging the establishment of private fish ponds throughout the State, and large numbers of fish have been distributed free to such ponds. Owing to the great natural abundance of fish in the sections overflowed by the Mississippi River during the recent flood, it was not necessary to make any planting in the over-



Dead fish on the banks of Bayou Teche killed by fermenting sugars
in sugar house waste.

flowed areas during 1927, and thus a much heavier planting was possible in lakes and streams not affected by the high waters.

Plans for a ten-fold increase in the capacity of the state fish hatchery have been perfected, and it is expected that the new culture ponds will be in operation during the coming spawning period in the spring of 1928. Included in these plans is a new idea fish pond covering about eight acres. Several self-supporting, parish-controlled hatcheries of this type are also to be constructed at our suggestion during 1928 and maintained under our supervision. These ponds will differ from those already in use in this and other states, in that the food for the adult fish used for spawning purposes as well as for the young fish, will be raised in the ponds, and be of a character the fish thrive best on.

During 1925 a total of 160,657 game fish were dis-

tributed from the Beechwood Hatchery and during 1927, 89,980 game fish. This last figure does not represent a falling off as it would seem to indicate, but due to the fact that a greater percentage were left in our ponds until the end of the year, when they had attained a much larger size, and were then distributed, they were better able to take care of themselves when placed in the streams. This work is under the direction of J. C. Forsyth, fish culturist and superintendent of the Beechwood Hatchery.

Another great lesson we in Louisiana have learned from nature's efficient method of stocking her streams, as exemplified during the recent floods, is that the policy of planting fry which are transported for great distances by rail or truck is inefficient and uneconomical, and what we need is the preservation of natural conditions, as pertain to places of protection, spawning grounds, and food areas and the prevention of harmful pollution. A few dollars spent in the preservation of swamps adjacent to streams and lakes will mean more than expenditures of thousands on artificial fish hatcheries. There has never been a shortage of fish fry in Louisiana waters taken as a whole, but there is a shortage of food organisms during every drouth, largely because of the drying up of swamps and marshes where this food develops.

Other observations point to the unnecessary restrictions placed upon both sport and commercial fishing by close seasons. The output of fish from our waters should be gauged in pounds per acre per year, and not in eggs laid per year, and as long as there is no shortage of fry, the annual output can only be increased by placing size restrictions on all species and dispensing with close seasons. The sizes for each species should be such that each fish will have passed through one spawning period before attaining legal size. This written into the law, and rigidly enforced, combined with better preservation of those natural conditions throughout the State which are so favorable to the development of the young, would assure a permanent annual output of both game and commercial species, of tremendous magnitude.



Dam in Calcasieu River at Oakdale. Such dams create fine natural fish hatching and increase the fish life in a stream manifold

Water Pollution in Louisiana

Better results have been attained in fighting the pollution of streams and more streams have been restored to their pristine condition during the past nine months than during the entire previous history of the Department. This has been due to the result of a general biological study by the director, covering several years past, of practically all of the streams, lakes and other waters of the State in which pollution had been reported, followed by a vigorous campaign against polluting industries made possible by our knowledge of their wastes, their effects upon the streams, and their remedies. In most cases, after it became known that we were in earnest in our efforts to enforce the stream pollution law, the industries pledged cooperation and assisted us in studies of their wastes and methods of preventing them from doing injury. A number of charges had to

be filed and are pending at this time, but the cases will not be pressed in those instances where remedies are applied or cooperation assured.

Different types of polluted waters in this State result largely from oil wastes, paper mill wastes, sugar mill wastes, and gravel washings. There are also a few miscellaneous trade wastes, and city sewerage and drainage give a small amount of trouble, but since most of our sewerage and industrial wastes are discharged into the Mississippi River or very large streams which are capable of purifying themselves, Louisiana has relatively little trouble with stream pollution when compared to the great industrial centers of the North and East. This State is now prepared, as a result of these studies to remedy the conditions which have heretofore hindered the full development of its water resources.

Our preliminary studies of stream pollution and the remedies therefor have been embodied in a paper entitled, "Water Pollution in Louisiana", by the director, which was published in the Transactions of the American Fisheries Society for 1926. This paper is at present being revised and enlarged and will soon be published as a bulletin which will be distributed free to all industries or individuals desiring information on this subject.

The following is a list of the streams of the State which are known to have been grossly polluted at some time during the past few years, and their present status:

Name	Location Parish	Character of Waste	Status at end of 1927
Dorcheat Bayou.....	Webster	Oil field effluents.....	Excellent condition.
James Bayou.....	Caddo	Oil field effluents.....	Excellent condition.
Little River.....	LaSalle, Grant, Winn	Oil field effluents.....	Partial recovery, early correction assured.
Tangipahoa River....	Tangipahoa	Gravel washings.....	Partial recovery, early correction assured.
Turkey Creek.....	} Evangeline	} Gravel washings.....	} Pollution cor'ct'd.
Cocodrie Lake....			
Hurricane Creek	} Evangeline	} Gravel washings.....	} Early correction promised.
Cocodrie Lake....			

Six Mile Creek.....	Allen	Gravel washings.....	Pollution cor'ct'd.
Whiskey Chitto.....	}		
Calcasieu River.....		Allen	Paper mill wastes..Pollution temp'r'y, now corrected.
Tony Creek.....	}	Ouachita	Paper mill wastes..Badly polluted.
Ouachita River.....			
Setocking Head	}	Morehouse	} Paper mill wastes..Badly polluted, early correction promised.
Creek		Ouachita	
Bayou Boeuf.....			
Bogalusa Creek.....	Washington	Paper mill wastes..Remedies being studied.	
Phillips Land.....	}	Plaquemines	Paper mill wastes..Pollution temp'r'y.
Company Canal.....			
Franklin Drain- age Canal.....	St. Mary.....	Sugar h'se wastes..Pollution temp'r'y.	
Bayou Tigre.....	Vermilion	}	Sugar h'se wastes..Pollution temp'r'y.
	Iberia		
Bayou Vermilion.....	Lafayette	}	Sugar h'se wastes..Pollution temp'r'y.
	Vermilion		
Bayou Teche.....	St. Martin, Iberia	}	Sugar h'se wastes..Pollution temp'r'y.
	St. Mary.....		
Concienne Canal.....	}	Assumption	Sugar h'se wastes..Pollution temp'r'y.
Bayou Lafourche }			
Houston River.....	Calcasieu	Turpentine.. still wastes	Pollution cor'ct'd.
Cedar Creek.....	}	Winn	Creosote wastes..Pollution cor'ct'd.
Dugdumonia Crk. }			
Bodcau Lake.....	Bossier	Sawmill refuse.....	Pollution cor'ct'd.

SALT WATER FISHERIES

The important feature of the conservation of our salt water fisheries, as in the case of the fresh water fisheries, should be regulations designed for the preservation of undersized fish, shrimp, and other species, especially those which it is commercially unprofitable to market. Size limits should be placed particularly on speckled sea trout, sheepshead, red fish, and flounders, shrimp, crabs, and diamond-back terrapin. Further, the size of the mesh of seines, trammel nets, trawls, and other tackle used for the purpose of catching salt water species should be raised so that practically all undersized individuals will escape when such tackle is operated.

The salt water fisheries have all been benefited by the added food supply poured into the bays and lakes of South Louisiana by the Mississippi flood waters. While there are no accurate statistics available as to the increase in the catch of salt water fish, many species

became so abundant immediately after the recession of the flood that it was impossible to market them at a profit. Speckled sea trout, red fish, shrimp, and crabs were found in phenomenal numbers all along the Louisiana coast.

The absence of a statistical clause in our salt water fish laws, such as we have in our fresh water fish and shrimp laws, makes it difficult for us to get accurate statistics on this valuable industry, and I would recommend that whenever the Louisiana laws regulating all of the fisheries of the State are revised or amended, provision be made to secure compulsory statistics on all fisheries alike. Thus over a long period of years the effects of fluctuating natural conditions can be studied, likewise the effects of the drain on each species by the fishermen can be determined, assuring the industries proper scientific conservation without being unnecessarily handicapped by premature or unnecessary legislation.

Salt Water Fish Revenues

The only revenues derived from salt water fish are from resident and non-resident seines and trammel nets, Table 3. There are a number of species of salt water fish taken in the shrimp trawls and marketed, but as there are no separate revenues derived from this source, the trawling licenses are included under salt water shrimp revenues. There are practically no changes in the salt water fish revenues for the years 1926 and 1927. While there was a slight decrease in the number of seines and trammel nets used, there was actually an increase in the revenues due to the fact that the number of non-resident trammel nets was increased, and the revenues derived therefrom are consequently higher than for the resident licenses.

Total salt water fish revenues for the preceding two years, 1924 and 1925, were \$2,620, and for 1926 and 1927, \$4,280, showing an increase of \$1,660, or an increase of over 60 per cent.

Table 3
SALT WATER FISHERIES REVENUES

Source	1926		1927	
	Number	Amount	Number	Amount
Resident and Non-resident Fish Seine Licenses---	72	\$ 855	67	\$ 805
Resident and Non-resident Fish Trammel Net Li- censes -----	120	1,275	115	1,350
Total Salt Water Fish License Revenues-----	192	\$ 2,130	183	\$ 2,155
Diamond Back Terrapin Dealers' Licenses-----	5	\$ 350	6	\$ 450
Resident and Non-resident Shrimp Trawl Licenses	692	\$ 7,700	913	\$ 9,130
Resident and Non-resident Shrimp Seine Licenses	143	1,950	120	1,500
Resident and Non-resident Shrimp Freight Boat Licenses -----	28	320	128	640
Shrimp Canning and Packing Licenses-----	15	375	19	475
Shrimp Drying Platform Licenses -----	10	137	29	435
Total Shrimp License Revenues -----	888	\$ 10,462	1,209	\$ 12,180
Severance Tax on Green Shrimp sold fresh or for canning: resident @ 10c per bbl.-----	71,280 bbls	\$ 7,128	92,806	\$ 9,283
Non-resident @ 20c bbl.	15,775 bbls	\$ 3,155	494	98
Severance Tax on Dried Shrimp @ 35c per 100 lbs. -----	885,674 lbs	3,399	1,073,890	3,744
Total Shrimp Severance Tax Revenues-----		\$ 13,684		\$ 13,157
GRAND TOTAL Shrimp Revenues -----		\$ 24,147		\$ 25,337
GRAND TOTAL of Salt Water Fisheries Reve- nues -----		\$ 26,626		\$ 27,942



A SHRIMP TRAWLER IN BARATARIA BAY

Salt Water Shrimp Revenues

Salt water shrimp license revenues for 1927, Table 3, shows an increase in all items over 1926, except seining licenses and severance tax. Seining license revenues decreased \$450, whereas severance tax revenues decreased \$506. In spite of these decreases, total shrimp revenues increased \$1,210.

This falling off in seine and severance tax revenues is due to two causes, the gradual decrease in the number of seines used over a long period of years, as trawling is resorted to more and more, and to the new salt water shrimp law which prohibits non-residents from shipping unshelled shrimp out of the State of Louisiana, effective since June 15, 1927. All other shrimp revenues have shown a decided increase, particularly the use of trawls. The total number of trawls operated in 1926 was 692, and in 1927 this increased to 913.

Table 4
COMPARATIVE STATISTICS OF THE SHRIMP INDUSTRY OF LOUISIANA
1921 to 1927, Inclusive

	1921	1922	1923	1924	1925	1926	1927
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
*Green Shrimp Dried-----	6,775,072	8,783,030	7,938,236	8,923,614	10,961,764	7,749,647	9,396,538
Green Shrimp Canned or Sold Fresh in Louisiana-----	20,419,350	10,294,200	19,858,020	19,396,230	17,150,490	14,968,800	19,495,350
Green Shrimp Exported for Canning-	7,038,230	3,823,260	4,493,160	3,311,280	4,398,840	3,314,640	2,796,360
TOTAL Green Shrimp produced-----	34,232,652	22,900,490	32,289,416	31,631,124	32,502,094	26,033,088	31,688,248
**VALUE -----	\$ 1,026,979	\$ 687,014	\$ 968,682	\$ 1,107,089	\$ 1,137,573	\$ 911,158	\$ 1,109,089

*8% pounds of Green Shrimp produces 1 pound of dried shrimp.

**Value at the fishing grounds: To this should be added the value of the product to the dealers and retailers which double and triple the valuation figures enumerated in the above table.

Status of the Shrimp Industry

The new Salt Water Shrimp Act, promulgated July 28, 1926, which prohibits the taking of salt water shrimp out of the State until the heads and hulls thereof have been removed for the purpose of manufacture into fertilizer or as an element in chicken feed, became effective June 15, 1927. Enforcement of the law by our agents resulted in litigation by Mississippi shrimp packers, a temporary injunction against enforcement by the department being granted on September 6, 1927. The Department of Conservation, acting through the Attorney General's office, carried the matter to the United States District Court where the injunction was dissolved on December 27, 1927, but the Mississippi packers appealed to the United States Supreme Court and a decision will be rendered probably before June, 1928.

The final decision will have far reaching significance in that it will determine whether a state will be able to regulate the conservation of migratory aquatic life found within its waters.

It is very gratifying to report a continued production of phenomenal catches of salt water shrimp, Table 4. Several years ago when trawls were introduced in Louisiana, many fishermen and dealers in sea foods believed that because of the advent of the trawl the shrimp fishery was doomed to depletion as in the case of the Atlantic lobster. The gathering of valuable statistics which are compulsory under the law has shown that this fear is unfounded and that our present shrimp laws are sufficient to maintain that industry. In one respect the shrimp law is unnecessarily prohibitive in that during the summer months, large shrimp which are abundant off shore in the Gulf of Mexico cannot be dried or canned in Louisiana plants, whereas they can be manufactured in adjacent states. Biological studies which I have made, as biologist for the department, over a period covering nearly ten years, have shown that the adult shrimp in the open Gulf are largely protected by natural conditions and the laws should be so flexible that fishermen can obtain them whenever and wher-

ever they may. On the other hand, I believe the laws should be more rigid in the protection of small shrimp, especially those under four and one-half inches, especially when found in inside waters, where they occur in tremendous quantities at certain seasons of the year. Conditions affecting the abundance of shrimp are so varied that the restrictions should be as flexible as possible and yet capable of such rigid enforcement that the fishermen can catch large size shrimp in any waters whenever they are available, but a severe penalty should be provided for both fishermen and dealers who have undersized shrimp in their possession.

RECAPITULATION, ALL REVENUES OF FISHERIES DIVISION

	1926	1927
Fresh water fisheries-----	\$ 24,217	\$ 32,658
Salt water fisheries-----	26,626	27,942
Grand total of all revenues--	\$ 50,843	\$ 60,600

The revenues of 1927 show an increase of \$9,757, over those of 1926, notwithstanding the new shrimp law which reduced shrimp revenues during the last six months of 1927, and the flood beginning in April which affected certain fresh water fish revenues for that year.

RECEARCH AND EDUCATIONAL WORK

During the past two years, much research work has been undertaken by this division. Knowledge particularly has been sought relating to the life histories, rate of growth, and breeding seasons of fresh and salt water species of fish and other important aquatic organisms. Studies were also made of the various kinds of nets and tackle used in taking both fresh and salt water species, and with this information we are in a position to recommend various kinds of tackle and sizes of mesh to be used for different purposes. Our aim is to produce a maximum annual yield in each fishery with little or no harm to the young or food supply of each

important species concerned. Much attention has been devoted to the streams and lakes themselves, our survey covering practically every section and condition found in the State, and both normal and polluted waters. Our studies of polluted waters, and of the conditions due to the Mississippi flood have already been outlined above.

Table 5

LOUISIANA FISHERIES STATISTICS		
Approximate Annual Wholesale Value of Each Commodity		
	Quantity	Value
Fresh water commercial fish-----	10,000,000 lbs	\$ 1,500,000
Fresh water game fish-----		1,000,000
Salt water products not entering trade (food value) -----		1,000,000
Salt water commercial fish-----	16,000,000 lbs	2,000,000
Salt water shrimp-----	35,000,000 lbs	3,500,000
Diamond-back terrapin, turtles, crabs, river shrimp, mussels, and miscellaneous-----		1,000,000
Frogs -----	1,000,000 lbs	500,000
Oysters -----	2,500,000 bu	2,000,000
TOTAL -----		\$12,500,000

The practical results of these field surveys and laboratory studies are too many to be outlined in this report, but a single instance will be cited, namely; the discovery of a new species of small mouthed black bass native to the spring fed rivers of the State. Superficially resembling the large mouthed bass, its structure and habits are quite different however. It is partial to rapid running waters and its habits resembling those of a true trout are quite a contrast to those of the large mouth which is now found to thrive only in still waters. It is very predaceous, and the large mouthed species which is not capable of sustained effort in such streams, falls easy prey to it. It can easily be seen that earlier efforts to stock such streams with the large mouthed bass raised at the hatchery were a total loss to the State. It is such information that has led, under the present administration of this division, to a new policy of stocking

our different types of waters only with species ideally suited to them, and with fish of sufficient size to be able to take care of themselves under the conditions of existence they are apt to meet in nature. It means the raising of the new species of bass at the hatchery if we intend to stock rapid running waters with a fish that is capable of living and thriving in such waters.

Our educational work, which was done largely in cooperation with the Bureau of Education of the department, consisted of lectures before civic, business and sportsmen's organizations, schools, and scouts, field work among the scout organizations, and other means of dispensing knowledge concerning our fisheries and their conservation. Two radio talks were given by the director, one from Station WRC at Washington, D. C., and one from WLAC at Nashville, Tenn. Papers and lectures were given before the American Fisheries Society, the American Association for the Advancement of Science, and the Ecological Society of America. Articles of interest were supplied frequently to every newspaper in the State, and occasionally to the National Press services, and a number of articles were prepared for Conservation News. A number of mimeographed pamphlets dealing with various phases of fish life or fish conservation were prepared for distribution by mail to interested citizens, and the following publications have been made available in reprint form for distribution to anyone interested in their respective subject matter:

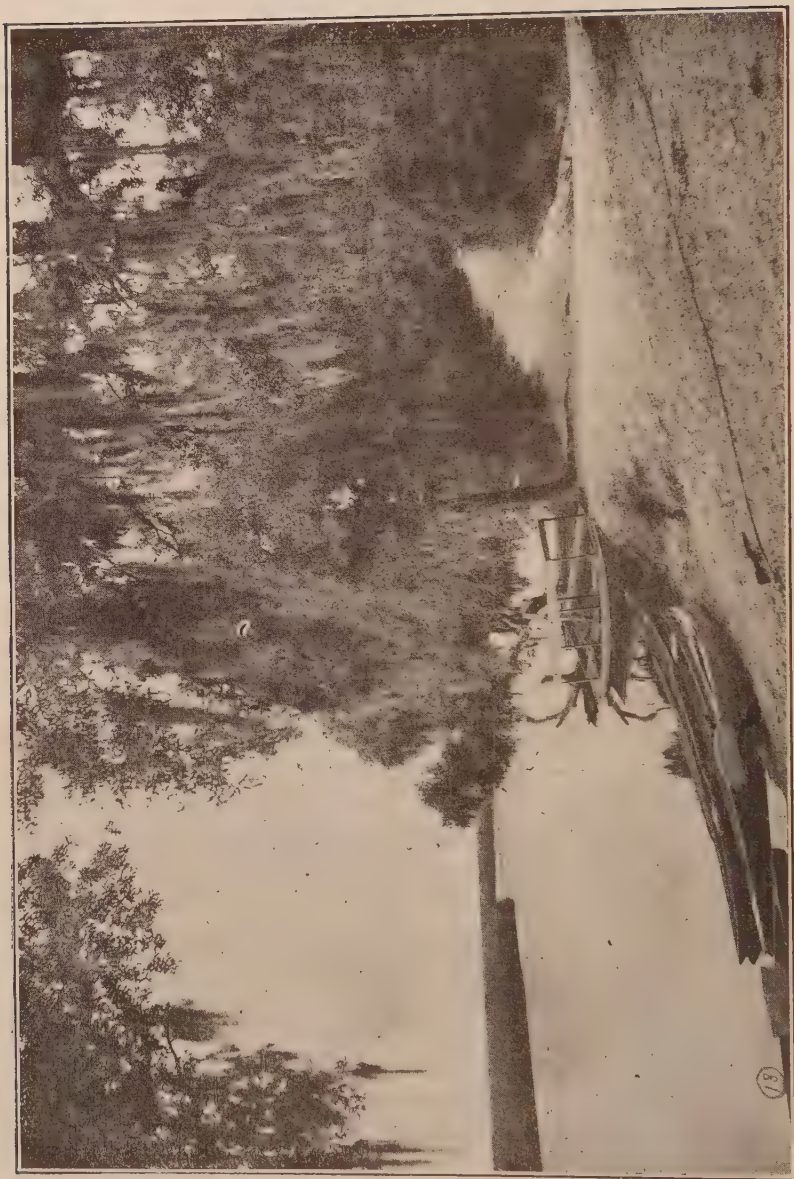
Technical Paper No. 2.—ENGINEERING ASPECTS OF THE PROBLEM OF SALT MARSH MOSQUITO SUPPRESSION IN LOUISIANA,

Technical Paper No. 3.—DISTRIBUTIONAL PROBLEMS OF THE COLD-BLOODED VERTEBRATES OF THE GULF COASTAL PLAIN.

Technical Paper No. 4.—FLOOD CONTROL IN THE MISSISSIPPI VALLEY IN ITS RELATION TO LOUISIANA FISHERIES.

Technical Paper No. 5.—WILD LIFE IN LOUISIANA.

Technical Paper No. 6.—LOUISIANA WET LANDS AND THE VALUE OF THEIR WILD LIFE AND FISHERY RESOURCES.



AN OAK-SHADED, MOSS-DRAPE LOUISIANA BAYOU AND HIGHWAY

Report of the Bureau of Education

BESSIE W. SANDERS, Director

"In New England we are turning from legislation to education which is the ONLY thing that will safeguard conservation for the future."

—Edward Howe Forbush

Louisianians who think have slowly but surely awakened to the same realization—that if our natural resources are to be saved, we, too, must likewise turn our thoughts to education. The masses of the people must be informed of the value of our natural resources, and must learn to think and act in terms of their conservation, for without public opinion back of us, our whole scheme of law enforcement is a failure.

Realizing this, and in order to co-ordinate the educational work being undertaken by its various divisions, the Department of Conservation established the Bureau of Education in December, 1925. A few months later, in September, 1926, at Mobile, during the 20th annual convention of the International Association of Fish, Game, and Conservation Commissioners, we find a resolution being passed endorsing this education of the young and going on record as recommending to all game commissioners and sportsman's organizations the desirability of instituting and carrying forward some well-formulated educational program in the interest of conservation. So Louisiana is justly proud that she is one of the pioneers in this line of work.

While we endeavor to reach all classes, special attention is being given to the youth of Louisiana, that they may be taught the value of our natural resources in a systematic manner.

The work of the bureau in these, its first two years of existence, has been greatly hampered by the lack of funds and lack of assistance but, in spite of all obstacles, the work has gone steadily forward. We have received great encouragement and cooperation from T. H. Harris State Superintendent of Education; Nicholas Bauer, Superintendent of Education in New Orleans; and Rev. Kearns, Superintendent of Catholic Parochial Schools,

as well as the greatest assistance and courtesy from the parish superintendents and the principals of all public and private schools visited. We are also indebted to the New Orleans and Shreveport papers, as well as to those of the parishes, for space and hearty encouragement given us.

As part of a carefully worked out system, school programs in 1926-1927 were prepared by the director of the bureau and mailed out to all the schools. Wild life programs were sent out in the fall just before the hunting and trapping season; Arbor Day programs were sent out for the second Friday of January, which date has been set aside for its celebration by the State Board of Education; and Bird Day, observed in honor of Audubon on May 5th, the traditional birthday observed by the Audubon family. These programs consist of songs, recitations, valuable information given in an attractive form, and an animal, tree, and bird contest. Bird Day windows were installed in New Orleans and Baton Rouge in May, 1926; the same was planned for 1927 but on account of the high stage of water throughout the state, this was called off.

In 1926, 2,000 programs were issued. These proved so popular that in 1927, 10,000 were distributed, not only to schools but to Boy and Girl Scouts, Camp Fire Girls, sportsmen's clubs, women's clubs, and other organizations. The Arbor Day program in 1927 was accompanied by an offer of a variety of trees to be shipped to schools for planting on that day. This offer was accepted by 168 schools, and hundreds of trees were shipped from the State Nursery to all parts of the State, through the courtesy of the Forestry Division.

409 lectures were given in 1926-1927; 147 of these lectures were given in schools, besides others in clubs, by the director of the bureau, and were attended by 58,919 persons. An assistant during his four and one-half months' stay with the bureau gave 132 lectures in schools, churches, and clubs, about 27,000 persons being present at his lectures. These lectures were all given with stereopticon views, and specimens of birds, furs, and minerals of Louisiana were taken to the class room

so that the students would get first-hand knowledge, thereby making our resources a live, attractive study and of personal interest to them.

Speakers connected with other divisions gave for the bureau 130 lectures, many nature hikes and motion picture shows being given in the Boy and Girl Scout camps. In all, over 114,000 persons have heard lectures and seen specimens of our natural resources, most of these learning for the first time something of these wonderful gifts of nature. After these lectures most of the schools have essays written on our natural resources; the best of these are generally forwarded to the bureau, where they are on file. Numerous calls and many hundreds of letters from teachers, pupils of all ages, and other interested persons are received asking for literature and information on all subjects pertaining to our natural resources and their preservation. Many thousands of pieces of literature have been distributed, much of it going to the most remote sections of the State. Some literature has been sent to almost every known country, principally for use in libraries, that they, too, may learn of Louisiana's wonderful resources. Articles of interest are sent to the press to keep the public informed of its duty toward preserving these resources and of the activities of this department.

Previous to the hunting and trapping season of 1927, copies of our game laws were mailed to every school and Scout camp, so that all might familiarize themselves with the conservation laws of the State. Films designed to increase knowledge and interest in our resources have been loaned to the schools, Salvation Army, and other organizations. Two programs have been prepared in cooperation with the Louisiana State University extension work, so that our natural resources have also been studied in the rural communities.

A few Audubon Societies, formed in the State a few years ago have been revived and many new ones have been formed for the study of our birds and animals. Hundreds of Audubon educational leaflets and other Audubon Club literature have been distributed to

all schools. The Audubon Societies of New Orleans were entertained on Audubon's birthday in 1927 at the State Museum by a talk on birds given by the director of the bureau, also a motion picture show of our beautiful Louisiana birds.

An effort was made in the summer of 1927 to reach every summer school throughout the State. Several days were spent by the director at the Natchitoches State Normal College and the Southwestern Louisiana Institute at Lafayette and many talks made, so that we might interest all the teachers of Louisiana in this great work, teachers having an opportunity as no others have of planting the seeds of conservation in the minds of their charges, and thus rendering service of great value.

The bureau has had numerous requests from parish superintendents, from principals of schools, women's clubs, and others, for many more lectures than we have been able to finance.

Louisiana has made a splendid beginning along educational lines, but it is only a beginning. This important work must be continued day by day, year after year, until every citizen shall understand his full duty towards conserving the natural resources of his State.

Enforcement officials can never stop all violations of conservation laws, but an educated, earnest citizenry can. Our endeavor is to instruct all adults and to raise every Louisiana child, both white and colored, with a thorough knowledge of our resources. Then, and not until then, will our resources be safe, for then we will have in every Louisianian a conservationist; a conservationist who thoroughly understands the importance of aiding in the development of our commercial resources because of their enormous value to the State and Nation; a conservationist imbued with a deep respect for all conservation laws and a great desire to enforce these laws; a conservationist anxious not only to do his own part but to influence others in keeping this State foremost among America's greatest play-grounds by preserving for posterity her great and unequalled outdoors.

Report of the Division of Enforcement

WILSON S. HOLLAND, Director

The Division of Enforcement of the Department of Conservation of Louisiana, as its name implies, was created for the purpose of apprehending and prosecuting violators of conservation laws. At the close of the biennial period, December 31, 1927, it was composed of a director, assistant director, four district supervisors, forty-nine agents, and seventeen boatmen.

In the spring of 1928 the commissioner reassigned the enforcement districts, making seven districts instead of four. This was done after a careful study of natural conditions and the practical experience of the men in the field in keeping down violations.

The enforcement districts, the parishes in each district and the supervisor in charge, with his postoffice address, follow:

District No. 1

Dr. A. W. Turner, Supervisor, Box 32, Shreveport, La.
Caddo, Bossier, Webster, Claiborne, Union, Morehouse, Lincoln, Ouachita, Jackson, Bienville, Red River, Natchitoches, Vernon, Sabine, DeSoto, and Beauregard.

District No. 2

T. J. Texada, Supervisor, Alexandria, La.
Avoyelles, Rapides, Grant, Winn LaSalle, Catahoula, Concordia, Tensas, Franklin, Caldwell, Madison, Richland, East Carroll, and West Carroll.

District No. 3

E. L. Magee, Supervisor, Franklinton, La.
Washington, St. Tammany, Tangipahoa, St. Helena, Livingston, East Baton Rouge, East Feliciana, West Feliciana.

District No. 4

T. J. Toler, Supervisor, Crowley, La.
Calcasieu, Cameron, Allen, Acadia, Jefferson Davis,
Evangeline, and Lafayette.

District No. 5

Edw. F. Woods, Supervisor, Lottie, La.
St. Landry, Pointe Coupee, West Baton Rouge, Iber-
ville, Ascension, and Assumption.

District No. 6

H. S. Sealy, Supervisor, New Iberia, La.
Vermilion, St. Martin, Iberia, St. Mary, Terrebonne,
and Lafourche.

District No. 7

A. J. Miller, Supervisor, New Orleans, La.
Jefferson, St. Charles, St. John, St. James, Plaque-
mines, St. Bernard, and Orleans.

We submit tabulations of arrests and convictions
for 1926-1927 which show our increasing activities in
this line.

Louisiana laws also authorize conservation agents
to confiscate, when unlawfully taken or possessed, game,
fish, fur, traps, snares, nets, illegal tackle, et cetera.

Our activity in this line is shown in the following
summary of confiscations during 1926-1927:

Game confiscated, including ducks, geese, snipe, doves, deer, squirrels, rabbits, et cetera. (Approximate food valuation) _ \$	1,553.75
Fish, all varieties, including shrimp and oysters (approximate food valuation) _	31,656.85
Fur (selling price) _	2,239.65
Traps, illegally operated (sold or de- stroyed) _	650.50
Illegal fishing tackle held for evidence or destroyed (approximate value at time of confiscation) _	2,132.00
Total _	\$38,232.75

The release alive of 80,000 pounds of buffalofish with an approximate food valuation of \$16,000 was an outstanding feature of our work. This fish was penned during the close season in a lake in St. Martin Parish.

Another big piece of work was the seizure of fur with a market value at the time of approximately \$10,000.00. It is alleged that this fur was taken in the close season and the case still is pending in court.

The game and fish confiscated was given to charitable institutions throughout the State. A list of some of these institutions follow:

Louisiana Baptist Children's Home, Monroe.
 Odd Fellows' Home, Jennings.
 St. Mary's Home, Lafayette.
 Maison Hospitaliere, New Orleans.
 St. Mary's Orphan Asylum, New Orleans.
 Bethlehem Orphan Asylum, New Orleans.
 Old Soldier's Home (Confederate Veterans, New Orleans.
 Little Sisters of the Poor, New Orleans.
 Waldo Burton Memorial Home, New Orleans.
 Milne Home for Feeble-minded Girls, New Orleans.
 Sacred Heart Asylum, New Orleans.
 Municipal Boys' Home, New Orleans.
 Warrington House, New Orleans.
 St. Mary's Boy's Asylum, New Orleans.
 Jewish Orphans' Home, New Orleans.
 St. Vincent's Infant Asylum, New Orleans.
 Touro Infirmary, New Orleans.
 Charity Hospital, New Orleans.
 St. Joseph's Orphanage, New Orleans.
 Masonic Home for Children, Alexandria.
 Sisters of Mercy, St. Martinville.
 Protestant Orphans Home, Baton Rouge.
 Volunteers of America, New Orleans.
 Lafon Home of Holy Family, New Orleans.
 St. Vincent's Hotel, New Orleans.
 Home for Incurable, New Orleans.

We submit the following table showing how we are

progressing in the matter of bringing violators of conservation laws to justice:

1926

	Arrests	Convictions	Acquittals	Charges Withdrawn
January -----	29	13	4	--
February -----	69	37	--	--
March -----	46	43	11	--
April -----	20	10	--	--
May -----	15	10	2	--
June -----	34	11	1	--
July -----	57	13	2	--
August -----	77	--	--	--
September -----	54	9	--	--
October -----	91	46	15	--
November -----	106	47	5	--
December -----	71	37	--	--
Total arrests during 1926-----			669	
Total convictions during 1926-----			276	
Total acquittals during 1926-----			40	
Number of cases pending, 1926-----			353	

1927

	Arrests	Convictions	Acquittals	Charges Withdrawn
January -----	60	11	5	--
February -----	34	21	3	--
March -----	75	12	--	--
April -----	41	18	3	--
May -----	44	2	--	--
June -----	33	14	6	--
July -----	30	5	--	--
August -----	75	11	--	--
September -----	77	7	3	--
October -----	145	42	2	--
November -----	117	47	11	--
December -----	53	2	--	2

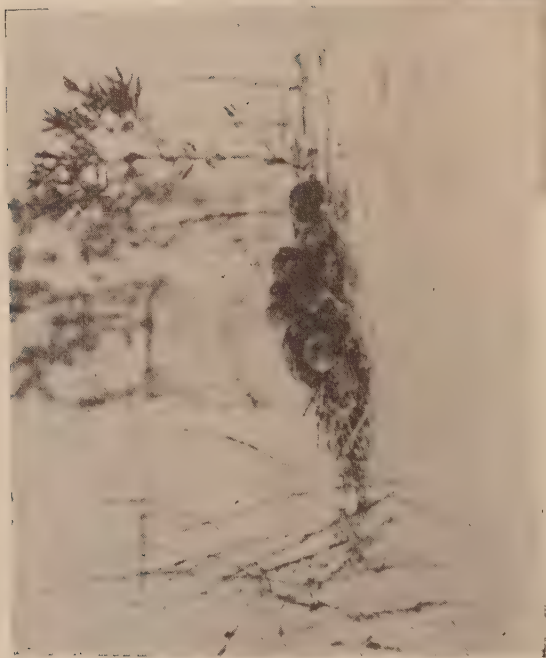
Total arrests during 1927-----	784
Total convictions during 1927-----	192
Total acquittals during 1927-----	33
Charges withdrawn during 1927-----	2
Number of cases pending, 1927-----	557

Recapitulation

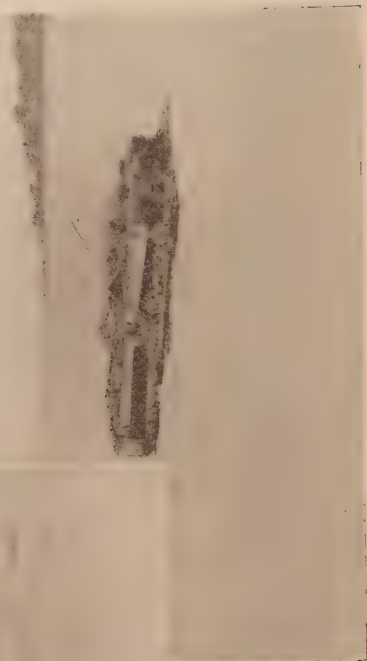
Total arrests for 1926-1927-----	1,453
Total convictions for 1926-1927-----	468
Total acquittals for 1926-1927-----	73
Charges withdrawn 1926-1927-----	2
Number of cases pending 1926-1927----	910

The department of conservation sustained the loss of two of its most valuable employees during the past year. Thomas Killeen, director of the division of enforcement, died after a short illness in February, 1928, and Frank Fargot, Jr., one of our veteran conservation agents was shot and killed by a negro violator of the hunting laws.

An old packing crate floated on railway ties and covered with grasses and branches, provided excellent nurseries for mother rats forced to raise families on the flood waters.



A muskrat family on a grass raft which they anchored to mangrove branches remaining above the flood level. These rafts gave the conservation forces the idea of building wooden rafts to the



Report of the Division of Wild Life

STANLEY C. ARTHUR, Director

SAVING FUR ANIMALS IN FLOOD TIME

When the ancient "*Missi'scpe*," the Indians' Father of Waters, burst through puny embankments called levees, designed by man for the purpose of holding the stream within narrow bounds, and spewed a devastating flood of yellow, silt-laden waters over the famed lowlands in Louisiana in May and June of 1927, one of the most spectacular and terrific struggles for human life and property and wild life in the history of the Nation was enacted.

This drama of life and death was staged not only on the river sides but throughout the great wooded areas, miles from the allotted course of the monster stream, swollen to record size by the drainage waters of a score and more states to the north. With the cracking of the man-made levees came one of the most spectacular relief movements known in the history of the country. Humanity was in danger and so was wild life. Men and women and children were hurried to the safety of refugee camps; but the children of the marshes, woods and swamps, the kindred of the wilds, were practically forgotten in the first rush and left to struggle alone in the engulfing waters—and tragedy loomed.

Louisiana, favored by nature as no other state in the abundance and variety of its bird and mammal fauna, was about to lose its heritage of wild life, it seemed, and the raccoon and opossum, the skunk and the otter, the mink and the weasel, the fox and the wolf, the muskrat and the wildcat, the squirrel and the rabbit, the bear and the deer faced extermination.

When the levees began buckling under the strain that the onrushing currents of the Mississippi hurled against them, the cry was "boats for humanity!" and the first of such rescuing craft to churn into action, as has been brightly written in the crevasse records of the

past, was the motor patrol fleet of the Department of Conservation of Louisiana.

So, in the beginning, the outlook was dark for the furanimal life of this State and predictions were freely made that Louisiana, the chief fur producing state of the Union, a commonwealth within whose borders more pelts of fur animals are produced annually than all of the provinces and territories of Canada combined, where are taken more furs by fifteen times than is produced in a twelve-month in far-off, cold Alaska, was to lose this wondrous bounty of an indulgent Mother Nature, that with the sweep of the flood waters her ascendancy as a fur producing area would end and her fur animals would be extirpated.

But the predicted extermination has not taken place. Due to the tireless and tremendous exertions of the field forces of the Department of Conservation countless thousands of the fur animals of the inundated areas were saved so they could reproduce their kind in favorite woodland and marsh haunts when the waters drained off and the Father of Waters was again harnessed to his embankments.

Loss Account Colored

There has been a great loss in all forms of wild life as a result of these floods of 1927. But this loss has never reached the proportions indicated by the dispatches of newspaper correspondents who needed dead and dying in the stories to give "color" to their contents and, since human beings refused to be drowned, the fur animals, and other forms of wild life, had to be the "victims" for the reporters.

If the saving of men and women and children was spectacular, the salvaging of muskrats and the other forms of fur animals was even more so. Conservation agents, having the invaluable aid of trappers, forest rangers, and members of the Izaak Walton League and other sports organizations, performed a task that will go down in history as one of the greatest that has ever been undertaken in the history of the conservation of wild animal life on the North American continent.



Wading waist deep in the flooded swamps conservation agents rescued deer floated them out in pirogues

Fur Animals Routed

When the first waters rushing through the shattered Arkansas levees crossed the state line and began filling the low wooded spots of East Carroll Parish, the first frenzied rush of the denizens of the wild to the safety of high spots began, raccoons, opossums, minks, otters, bears, wildcats, foxes, wolves, rabbits, squirrels, as well as the nimble-footed and terrified does and bucks and fawns of the swamp deer family found sanctuary only to be routed again, and practically cut off from the saving high spots, when the huge Milliken Bend levee on Louisiana territory "blew in". Not only were fertile fields and towns and settlements inundated but the newly-created Singer Wild Life Refuge of over 81,000 acres in Madison Parish was covered with a sheet of water five to six feet deep.

It was "sink or swim" for the fur animals, and

thousands of them made aquatic journeys in safety. Many of these animals, such as the raccoons and opossums, took to tops of trees and, while the currents from the muddy river raged below their retreats, they grew fat and lazy on a diet of spiders, grasshoppers and other insects driven from their homes in the grasses, that covered the leaves of the forest trees like dew. Minks and otters, wolves and foxes, bears and deer, made for the pine flats of the uplands, while others, trapped on isolated high land, took up the life of refugees and were fed by the State.

On Macon Ridge and on Sicily Island, two Louisiana high spots sufficiently elevated to keep land above flood crests, there was harbored a most remarkable collection of children of the wilds ever gathered together since Noah made his historic journey over other flood waters and there was enough fur there (on the animals' backs, however) to have struck joy to the heart of a New York fur auction.

Never was it better exemplified how common danger draws together the hunter and the hunted. Men, whose chief recreation in winter, was the destruction of wild life for sport, worked day and night for the salvation of these same animals. Other men who gained a livelihood from the pelts they could skin off these same creatures, guarded and fed them and arrested those who would destroy these harassed animals.

Animals of prey and those animals upon whom they generally preyed in other times, lay down together like the Biblical lion and the lamb.

So went the life of the wild life refugees in North Louisiana in flood time. Then, far to the south, near where the Mississippi empties its waters in normal times into the smiling blue-green waters of the Gulf of Mexico, came the premeditated shattering of a monster levee by dynamite, just below the City of New Orleans so that the famed and ancient colorful Crescent City would be saved from possible inundation. The flood waters poured with uncanny ferociousness into one of the most valuable fur producing areas on the North



The refugee muskrats rode out the flood on any floating debris that came their way

American continent, the famed muskrat lands of Delacroix Island, in Bernard and Plaquemines Parishes, a region during the past winter that produced in excess of 2,000,000 muskrats worth nearly \$2.00 a pelt.

Aquatic as the muskrat is, it was unable to combat the raging flood of river waters that poured through the man-made opening and engulfed its marsh habitat; and thousands upon thousands of them were drowned while other thousands of them breasted the waters that inundated their feeding grounds of three-square rush, cattail and bulrush, and swam to the safety of the lower marshes where the waters leveled to those of the Gulf.

Faced with a terrific economic loss if the muskrat population of these marshes would be exterminated, owners and lessees of this land, members of the Conservation Department in charge of wild life and the trappers of the region made every known endeavor to save the industry. Trappers worked practically "26 hours a day" to succor the very animals they pursued with their steel traps every winter and, for the first time in history, "life rafts for muskrats" were hastily constructed and floated on the vast yellow inland sea.

Levees Were Dynamited

When the dynamite charges tore the Caernarvon levee into bits there was no animal, big or little, more shy, more secretive, more afraid of man than the muskrat. But with the coming of the flood which engulfed them, their homes and their young in a seething maelstrom of water, this instinctive fear of man disappeared as conservation agents and trappers, bent on their errands of mercy, rescued thousands of them from the flotsam on which they had taken refuge. Everything that floated—a log, a piece of plank, limbs of trees—anything that was buoyant, held its cargo of refugee 'rats. Some shared their havens with rabbits, with raccoons, with opossums—even with deadly moccasin snakes and other reptiles.

When the first life rafts were constructed and moored to the waters that covered their marsh homes



Loading rescued deer in the hold of a gasoline boat to convey them to the high land

these little furred creatures covered them in unbelievable numbers. As we paddled our pirogues among the rafts some of the muskrats—the big strong ones who had plenty of stamina and pep and dash left in them—would dive into the flood and swim away. Others, those weakened by their long struggle for life in the waters, or pregnant females heavy with young, would permit close inspection and hungrily seize upon the grasses we would pile on their rafts.

As our life boats traversed this newly formed sea we beheld muskrats, young and old, swimming with the swift currents. Some were energetically making their way somewhere and with evident unconcern and when we neared them, bent on rescue, they would dive beneath the surface with a resounding slap of the tail and defy our good intentions. Others, sensing possible rescue, would make straight for our boats where they

would climb paddles or suffer themselves to be lifted from the water with long-poled nets, and some even permitted us to take them aboard with bare hands, with never an attempt to resent the familiarity with their long incisors, and when placed on the bottom of the canoe would lay supine from exhaustion.

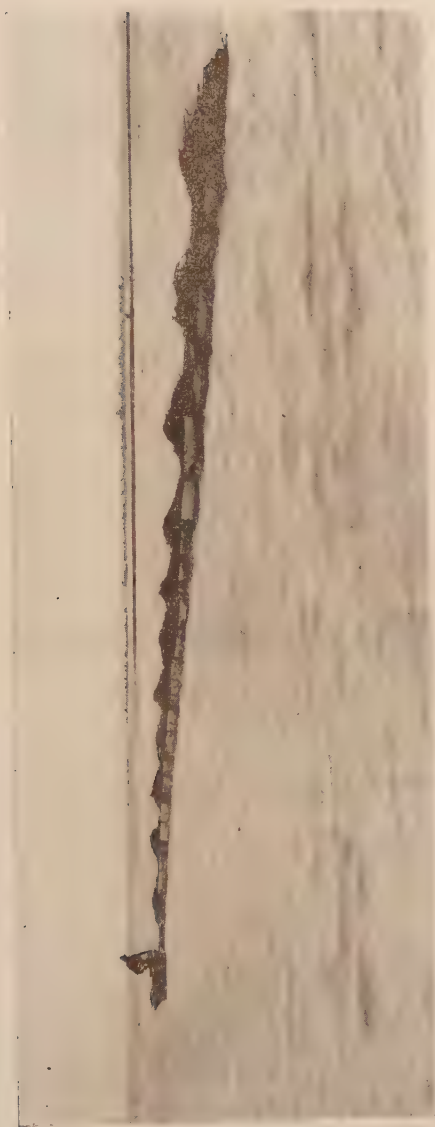
To show their complete confidence in man in this new, strange role timid 'rats rescued from the flood, as soon as they had recovered from their exhaustion and had combed their saturated pelage dry, would climb over our knees, laps and even up on our shoulders. One fellow perched on my knees while I took graflex shots at some of his struggling fellows swimming in the waters toward our Old Town canoe. Another found a resting place on John Durham's shoulders.

Devotion to Young

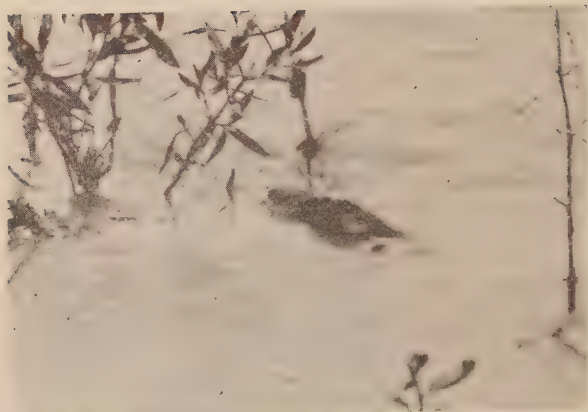
Pitiable sights were the antics of many of the animals struggling in the yellow swirl. Where the tops of cattails projected a few scant inches above the water were to be found "mice", as baby muskrats are called, precariously perched on the very tips while a frantic, devoted mother would swim about with her young, occasionally diving beneath the surface of the flood many feet to emerge with the root stalks of the three-cornered grass so that her young might be given the sustenance they must have if they were to live.

Many, many times we saw a devoted mother 'rat floating on her back near a cattail stalk. Down the tip would scramble a "mouse," so that it might feed from her breast. Whether its hunger was satiated or not it would not be long before the youngster would find itself dumped into the water and back to its cattail coign of vantage and safety it would scramble while a brother or sister would repeat the feeding operation.

Slowly, relentlessly the flood waters rose as the dynamite charges tore many pieces out of the levee, so that the opening could be enlarged and the stage of the river at New Orleans lowered beyond the danger line. Soon even the tip-tops of the high cattails were covered



A flotilla of rafts set out by the St. Bernard trappers to provide temporary refuge for the thousands of muskrats driven from their marsh homes by the crevasse waters

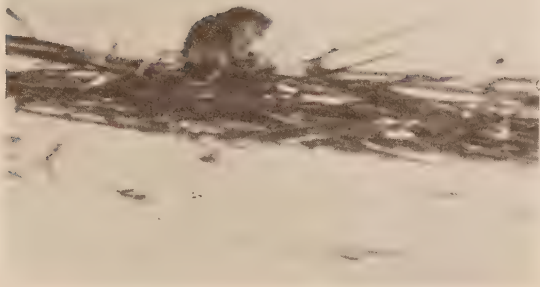


Muskats swam to the mangroves as a last place of refuge
before falling prey to the yellow flood waters
of the crevasse

and the mothers' heroic devotion and sacrifice was made a vain one; but it did prove, even among the creatures of the wild, that mother love was, indeed, the greatest thing in the world, whether it animates the mother of man or the mother of a muskrat.

Other families of muskrats, as soon as the first rising waters of the crevasse flooded their home marshes, began a frantic building of hills, as their grass-constructed houses are called, but it was soon found that the water was rising faster than they could build; and the little fur animals turned their attention to the construction of rafts which they made out of grass stalks and whole families occupied these frail floating platforms.

This display of natural instinct gave to those of us interested in the muskrat crop of this state an idea. If the muskrats wanted rafts, why not build great big ones? It was voted an idea. Just how good an idea it was none of us knew—for it had never been done before. William A. Walsingham and Manuel Molero, who owned and still own and control what is undoubtedly the greatest fur producing marsh in North America, or the world for that matter, gave the word:—"Build the rafts!"



When the flood waters came the muskrats constructed their own crafts

Life Rafts for Muskrats

Came a cargo of lumber, the ringing of hammers on nails, and soon the surface of the flood area was dotted with rafts—life rafts for muskrats!

The reaction of the 'rats was instantaneous and, quicker than it takes to tell, the rafts were crowded with refugees, 'rats of all colors, all sizes and sorts, and all were busy covering the boards with grass stalks for the triple duty of food, shelter and the important duty of providing cradles for the young that came in spite of Hell and high water and dynamite blasts.

But the muskrat is almost wholly nocturnal and, as the first rafts were merely hastily nailed to cross pieces, there was no protection from the hot rays of the Louisiana sun that poured down on this new inland sea; and blindness and other diseases induced by exposure began to appear among the fur animals crowding the floating havens.

While our first efforts appeared to be successful it became imperative that a new type of raft was needed if the muskrats were to be saved. To Harvey E. Roberts, a trapper and marshland owner, must go the credit for the raft that proved the most efficacious. Four 1x6 cypress planks, two inches thick and placed four inches



The type of life raft that proved the most efficacious in saving muskrats in the flooded districts

apart, were nailed to three 2x4 inch crosspieces. A foot-wide plank was attached to each side of the raft and held in place by another crosspiece laid across the exact middle of the top. Over this centre crosspiece was heaped a great armful of three-cornered rush, the favorite food of the muskrats of this section. While this type of raft was being constructed, skiffs, fish-cars, pirogues, rowboats, ordinary packing crates—anything that would float and carry a cargo of Spanish moss, tree branches, and grasses, were anchored in the flooded area and the 'rats used them for temporary succor, at least.

All in all, something like 1,000 to 1,200 rafts were utilized for the purposes of saving a sufficient number of these animals to insure "seed" muskrats remaining in the marshes when the waters would subside.

What the Rafts Accomplished

Just what these rafts have accomplished no one really knows at this time, but it is believed that these



Rabbits and muskrats shared the roof
of a shack for several days

rafts afforded **sufficient temporary relief** so that the muskrats forced to swim great distances had ample opportunity for recuperation before assaying another long immersion in an effort to reach high land and marsh out of reach of the crevasse waters.

Everything connected with the Mississippi floods, as far as the fur animals of the State of Louisiana is concerned, is not dark and drear. Many of the marshes that were subjected to the flow of the fresh water were actually benefited. On the west bank of the Mississippi, where a down-stream-bound steamer rammed a hole in the levee at Junior water flooded a marshland section that had not fully recovered from the effects of the droughts of '24-'25-'26 and the inhabitants of this region are looking forward with glee and anticipation to the muskrat harvest that will be the result of the revivification of the fresh-water flora, pointing to the crevasses of 1912 and 1922 as proof of a large



Rescued muskrat transplanted to the highland
in a canoe

muskrat increase following a crevasse of normal proportions—if there is such a thing as a *normal* cravasse.

Everything is not lost as far as the Delacroix Island section is concerned, if we are to follow Patrick Henry's formula and judge the future by the past. In May of 1922, when the Poydras levee caved-in, not three-quarters of a mile above the site of the dynamited crevasse in 1927, practically the same scene of desolation was enacted. Faced with their winter's trapping being wiped out and with no revenue in sight, the trappers of this region, with the knowledge of the Governor and the Conservation Commissioner of that time, shot, pitchforked, dogged and clubbed the rats frantically swimming for highland or those that had gathered in numbers of floating debris. Nearly one hundred thousand of such summer 'rats were handled by the fur trade of New Orleans at that time.

The winter of 1922-12 there was very little trapping done after the water which had remained on these same lands for a period of 58 days had drained off.

The winter of 1922-23 there was very little trapping to about 30 to 50 per cent of the normal population. The third winter, when trapping was carried on



Rescued muskrats soon forgot their inherited fear of man when they were saved from the flood waters

almost everywhere, there was about a 70 to 75 per cent return to normal. The '25-26 season indicated a 100 per cent return and during the 1926-27 season this very rich fur area produced more muskrats than any other section of the state, contributing 80 per cent of the state's total catch five years after a disastrous crevasse, and it is admitted by all that the inundation was directly responsible for the profusion in which the three-cornered grass and other food grew.

In 1927, when it became known that the area was to be flooded, preparations were made to re-enact the carnage of 1922. Guns were gotten out and shells imported in case lots. From the Department of Conservation, and the owners of the land most seriously affected, the marshes of the Acme Land and Fur Co., went forth the word that no coon rat was to be killed or the killer would go to jail. Not a rat was to be handled by the trade or the dealer would go to jail, and armed Conservation agents were hurried to the Delacroix Island territory to see that the fiat would be made good. Under the direction of the Division of Wild Life, the entire

section was patrolled and through the cooperation of the Acme Land and Fur Co. officials, whose best trappers were sworn in as special Conservation agents, all violations of this character were kept down in spite of the excitement prevailing.

Killers Were Jailed

Two men, who believed that we were not in earnest, did shoot twenty-two 'rats and skinned them out. The director of this division personally made the arrests, confiscated the skins, and the men served 11 days in jail before friends would bail them out. They still have their trial and punishment coming to them.

Trappers, who in previous years had not been particular as to a scrupulous observance of the fur trapping laws, were made special Conservation agents and for the first time in their lives became animated with a spirit of conservation and responsibility.

What will be the outcome? Will this prized section "come back" as it did five years ago?

Greatest 'Rat Producing Area

It will, if proper guardianship and law observance continues and this has already been arranged for by those most interested. It is positive that this wonderful fur producing area, the greatest of its kind on the North American continent, will be back to normal production within two years for the owners have not only prohibited trapping on these 150,000 acres but have trapped thousands of live muskrats and turned them loose on the interior of the tract to hasten the normal return of these fur animals.

While the toll of wild life, particularly among the fur animals, has been severe in some sections, and constant repetition of flood conditions would practically wipe out the wild life of the lowlands, still the loss has not reached the magnitude first estimated. This loss of wild life, whatever its percentage is finally decided upon, indicates that all conventions held to consider the Mississippi River flood problems must consider the effect

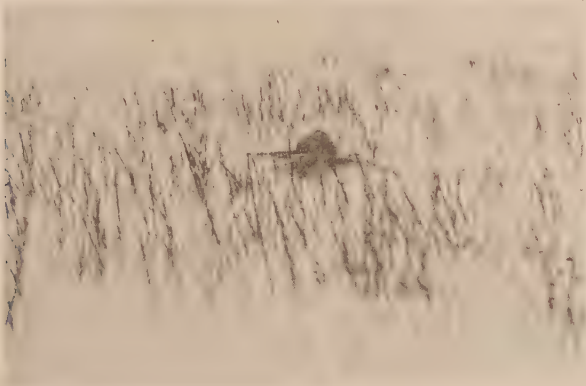
these inundations will have on the fur animals, for the animals have sufficient economic importance to the country at large to make the problem National in scope.

Then, too, the beneficial effects of flood waters on some sections, particularly the central and western coastal marsh areas, are to be considered. So must some of the interior sections of the State where the '24-25 droughts left their scars, which can only be erased by a deluge, in moderation, of course.

Louisiana fur animals will replenish their kind, but this will take time and vigilant protection, and to those who hold a pessimistic view of the situation it might be pointed out that before man and his levees appeared in the Mississippi delta country, that the whole region was subject to **annual inundations** and the mink, the otter, the raccoon, the muskrat, the opossum, the skunk, the fox, the wolf and all of the others that make up Louisiana's remarkable fur fauna, thrived and were here in greater numbers than we have them today.

SPECIAL PARISH CLOSE SEASONS

The matter of special close seasons in individual parishes for the purposes of giving added protection to game birds and game animals has in late years become an important administration problem. In a number of parishes the special close season regulations have been



All alone on its own raft

sought more for protection against "outside" hunters than for the purposes of giving protection to game that has diminished through over-hunting, in a few sections certain game birds and game animals have actually fallen off in numbers and, where the close season has been invoked and obeyed, the recovery of the game has been remarkable.

Under the law passed by the 1926 Legislature, right was given the Police Jury of any parish to apply to the Department of Conservation for the right to adopt an ordinance to curtail the open season in the parish, or any part of a parish, only when it becomes apparent that the game birds or the game animals are in need of such added protection so that the game can restock itself by natural breeding.

When such application from the Police Jury is received by the Commissioner of Conservation, and if conditions in the parish making the application indicate the need of such a close season, the Commissioner may then give written consent to the Police Jury to adopt an ordinance that will curtail the open season, but for not more than three consecutive years, this curtailment to apply to everyone, including the residents of the parish seeking the close season.

After receiving the permission of the Conservation Commissioner to pass the ordinance, it does not become effective until after notice of its adoption has been given by promulgation in the official parish journal once a week for four consecutive weeks prior to the **regular open seasons for hunting**. This was inserted in the law so as to give all hunters ample opportunity to know of the adoption of the ordinance at the time of the year when they are interested in making plans for their winter sport.

To keep these special parish close season laws uniform, the law makes all such close seasons begin on the legal date of the regular open seasons of each year. This automatically takes care of any changes that might be made in the fixing of open dates by the Legislature.

The plan has worked very successfully and with

fairness to everyone and it is recommended that the Legislature make no changes in this section of the general game act. It is true that a number of complaints reached the department from hunters in various sections of the State to the effect that the special close seasons held good only in regard to non-residents of the parish, while residents were permitted by parish authorities to hunt with impunity. This phase of the matter was investigated but no direct evidence was secured to substantiate the charges that were, in some instances, freely made.

Special close seasons now in effect include:

CADDO has been closed to the hunting of Bob White and squirrels for three consecutive seasons. This curtailment expired with the 1927-28 season.

BOSSIER was closed for two consecutive seasons on Bob White and squirrels, but opened in the 1927-28 season automatically. When application was made for a special close season to run an additional year the time for making such application had expired and the season was declared open by the department although the parish authorities passed an ordinance prohibiting the hunting of Bob White and squirrels. The Director of this division appeared before the parish authorities and explained the law and after the first of the year the season was opened to all hunters. Owing to the location of Bossier, hunters from Caddo, particularly Shreveport, visited Bossier in large numbers and it is deemed advisable to allow Bossier a close season next year, and for an additional season, if necessary, to allow the game to replenish itself.

MADISON.—Owing to the havoc created among the game by the floods from the Mississippi in the spring of 1927, the application of the Police Jury of Madison Parish for a one-year special close season on deer, bear, squirrel, and wild turkey was granted by the Commissioner. Although Madison Parish had already had several years of special close seasons on hunting and the big Singer Wild Life Refuge had been established in this parish, it was very evident that the flood damage was such as to allow this section of the State additional protection.

TENSAS.—In this river parish a special close season on deer, Bob White, and wild turkey was granted because of flood damage. This restriction was for the season 1927-28. For the two previous years special close season on deer, limiting the hunting of these game animals from December 26 to January 15, had been granted by the Commissioner.

WINN.—A three-year close season on the hunting of deer and wild turkey, for 1927-28, 1928-29 and 1929-30, was granted the Parish of Winn. It is believed, if this special close season is strictly observed, that the deer and the turkey will restock themselves.

CONCORDIA.—The Parish of Concordia applied to the Department for permission to close the parish for the season

1927-28 on deer, Bob White, and wild turkey and the consent of the Commissioner was given. When the ordinance was sent to the Police Jury it was not adopted because it did not carry a clause closing the parish against the trapping of animals. The Department explained that the special close season law applied to GAME birds and GAME animals only, and not to FUR-bearing animals taken for their pelts, and therefore the Department was without power to grant the request. The Police Jury adopted an ordinance prohibiting the trapping of fur animals, as well as extending protection to the game birds and game animals, but as it was done without the consent of the Commissioner the ordinance was without force and effect.

FRANKLIN.—The Police Jury of Franklin Parish passed an ordinance prohibiting hunting in November prior to the opening of the 1927-28 season without securing the necessary permit from the Commissioner of Conservation. The secretary of the Police Jury was notified that such an ordinance was not legal and the parish remained open.

GRANT,—An ordinance prohibiting the hunting of wild turkey and deer was passed by the Parish of Grant without securing the consent of the Department of Conservation and, additionally, it was passed without sufficient time for it to be advertised four consecutive weeks prior to the open season. Sportsmen of the parish petitioned the Commissioner protesting the action of the Police Jury and that body was advised that it had not acted in conformity with the law and the parish remained open.

NATCHITOCHES.—The Police Jury passed an ordinance prohibiting the hunting of deer in Natchitoches without applying to the Department for permission to do so and when the matter was explained the action was voided.

The Department plans to institute game surveys through the Division of Wild Life in parishes where applications are made for special close seasons and parishes contemplating such action should communicate their desires to the Department early in the year, preferably during the breeding seasons so that unbiased and technical investigations can be made of wild life conditions in the territory to be closed, so that the Commissioner's action may be predicated on the results of such surveys.

When an ordinance is passed it should be drawn with uniformity. The ordinances that have been drawn by this division and which have been adopted, read:

AN ORDINANCE

An ordinance prohibiting the hunting, shooting, trapping or destruction by any other means of _____ (names of game animals or game birds proposed to be protected) _____ in the parish of _____, and fixing the penalty for violations of the ordinance.

Section 1. Be it ordained by the Police Jury of the Par-

ish of-----, that the hunting, shooting, trapping or destruction by any other means of----- (names of game animals or game birds)----- is hereby regulated and prohibited in the Parish of----- for a period of----- consecutive years, or the hunting seasons of 1928-29, 1929-30 and 1930-21, the consent of the Commissioner of Conservation in and for the State of Louisiana having been obtained as required by Section 15, Act 273 of 1926.

Section 2. Be it further ordained, etc., that anyone violating the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction shall be fined not less than \$25.00 nor more than \$50.00, or imprisoned not exceeding 30 days, or both, in the discretion of the court.

Section 3. Be it further ordained, etc., that a certified copy of this ordinance be sent to the Commissioner of Conservation, and that the context of this ordinance be published in the official parish journal once a week for four consecutive weeks prior to the opening of the regular hunting season.

CAMP HUNTING

A number of the parishes in the State have solved one of the problems that has arisen with the advent of the automobile and the populating of the country—that of a large party of hunters moving into one part of the country, camping in a game section, and killing a large amount of game. This has been called, for the lack of a better term, “camp hunting regulation”.

The parishes pass ordinances prohibiting “camp hunting”, for more than a certain time and making it incumbent on the camping party to report to the parish sheriffs their intention of coming into the parish, the time the hunting will begin, and the duration of the hunt.

Iberville and West Baton Rouge Parishes regulate the duration of such camp hunting to 48 consecutive hours; Pointe Coupee and St. Landry Parishes give the camp hunters 72 consecutive hours for such camp hunting.

These ordinances, as drawn by this division, read:

AN ORDINANCE

An ordinance relative to hunting wild game quadrupeds and fixing the penalty for violations of the ordinance.

Section 1. Be it ordained by the Police Jury of the Parish of----- that what is known as “camp hunting” is hereby regulated and prohibited in the Parish of----- for a period of-----consecutive years from the-----

day of-----1928, the consent of the Commissioner of Conservation in and for the State of Louisiana having been obtained as required by law.

Section 2. Be it further ordained, etc., that "camp hunting" is hereby defined to be camping in the woods of the parish, or at or near any house or dwelling, with guns and dogs over night, for more than 72 consecutive hours for the purpose of hunting wild deer, squirrels, bear or other game quadrupeds.

Section 3. Be it further ordained, etc., that any organized or unorganized body of hunters desiring to camp in the woods of the Parish of----- for the purpose of hunting wild deer, bear, squirrels, or other game quadrupeds for the length of time permitted by this ordinance shall notify the sheriff of the parish of such intention, designating the time and the place where such camp will be located; the time the hunting will begin, the number and names, as well as license numbers, of those proposing to engage in the hunt.

Section 4. Be it further ordained, etc., that any one violating the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than \$25.00, nor more than \$50.00, or imprisonment not exceeding 30 days, or both, in the discretion of the court.

Section 5. Be it further ordained, etc., that a certified copy of this ordinance be sent the Commissioner of Conservation of the Department of Conservation, and that the context of the ordinance be published in the official parish journal once a week for four consecutive weeks prior to the opening of the regular hunting season for game quadrupeds.

SUNDAY HUNTING

A number of the parishes in the State have adopted ordinances which prohibit the hunting of game birds or game animals within the confines of the parish on the Sabbath Day. A number of the parishes, through Police Juries, petitioned the Department for permission to pass such ordinances but, as the Commissioner and others of the official personnel were opposed to such restrictions on merely religious grounds, such permission was not given. The parishes then passed the ordinances. Other parishes passed such restrictive measures without making application to the Department.

As this was a parish police regulation, and one over which the Department had no control, no action could be taken officially. While it was not officially advised by all parishes of such action, information came to the Department that the parishes of Bossier, Livingston, Morehouse, Ouachita, De Soto, Red River, Richland,

St. Helena, Webster, and East Feliciana put a ban on Sunday hunting.

We felt that applications for Sunday hunting prohibition should be rejected by this Department on the ground that it is only concerned in the saving of certain species of game birds and game animals and that it should forbid hunting only when it becomes necessary to allow such game to replenish depleted numbers, and that the prohibition of hunting on Sundays is not a conservation move in any manner, shape, or form.

Consultation with the Attorney General's office elicited a verbal opinion that such a prohibition came under the general police regulations that the State and its various sub-divisions are entitled to exercise. It was pointed out that the only law on the subject was contained in the action of the Police Jury of Jefferson Davis Parish when an ordinance prohibiting the exhibition of motion pictures, and contested by the theatres affected, was held valid not only by the district court but by the State Supreme Court as well, the high court holding that the parish authorities had such police power.

The only test of the constitutionality of such Sunday hunting ordinance that has come to the attention of the Department was in the case of two citizens of Caddo Parish arrested in Bossier Parish for hunting on Sunday. The district judge before whom the case was argued has not handed down his decision up to the time this report was written.

BLACKBIRDS AND RICE

For a number of years the Department of Conservation has been as concerned over the inroads made on rice by certain species of blackbirds as have the rice growers and in spite of studies made of the problem little headway has been made in arriving at either a solution or the means of minimizing the losses sustained. In 1925 application was made to the Bureau of Biological Survey of the United States Department of Agriculture for assistance and Dr. E. W. Nelson, chief, sent E. R. Kalmbach, one of the bureau's experienced bio-

logists, to Louisiana to make a detailed study of the problem.

At the finish of his investigation Mr. Kalmbach issued a preliminary report on his researches, which is reproduced below, and plans to write a more extensive paper on the relationship of blackbirds to the rice crop of the Gulf Coast region of Louisiana. The preliminary report suggests a means of control by the use of poison which will prove futile in the periods when the rice is in the growing or ripening periods:

"Blackbirds have been a source of trouble to growers of rice of the Gulf Coast of Louisiana and Texas ever since that grain was introduced into the southern prairie region. In many respects the problem is similar to that formerly presented by the bobolink in the South Atlantic States before the rice crop had been largely removed from that area. Damage is inflicted in spring, when the sprouting grain is a source of attraction; in midsummer, when the crop is in the "milk" or "dough" stage; and at harvest, when the shocked grain may be attacked not only by red-winged blackbirds, the principal offenders, but also by the larger grackles or "chocks" and, if the crop is late, by migratory blackbirds from Northern States.

Area Affected.

"In 1925 and 1926 a thorough study was made of this problem, particularly with the object of learning what measures could be adopted to lessen the annual losses suffered by rice growers. This survey revealed interesting facts. In the first place the area of severe blackbird damage, in which noticeable losses are experienced almost every year, is a very narrow one, following the southern edge of the rice area that borders on the extensive marshes lying along the Gulf Coast. In some instances this zone of severe damage can be traced as a single line of fields adjacent to the marsh. Three or four miles from the borderline severe blackbird damage is of irregular occurrence, depending largely on the presence of trees or local sloughs that are the attraction to the birds. In the central and northern portions of the rice belt, where the land has been under cultivation for a longer period of years and where most marsh areas attractive to blackbirds have been removed by drainage, noticeable damage to the rice crop is seldom experienced.

Extent of Damage Varies.

"Not only is the zone of severe blackbird damage

narrow, making the problem of relief a local one, but from year to year there may be great fluctuation in the extent and severity of damage. Rains during the sprouting season tend to increase damage by making the surface of the ground soft and easily probed by the birds. A harvest delayed by inclement weather also exposes the shocked crop to the attacks not only of the resident blackbirds but also of migrants from the North that arrive in October and November. Climatic conditions, such as the prolonged drought that occurred during the latter part of 1924 and the early part of 1925, also have an effect on the activities of the birds, causing them to avoid vast areas of burned-over marsh that normally support a large breeding population.

"In 1924 experiments conducted by one of the rice-growing companies of Louisiana indicated a crop loss as great as 22 per cent on certain fields close to the virgin marsh. In the following year similar experiments, many of which were carried out in the same fields, revealed no appreciable damage. On the basis of the total rice area of Louisiana, which included the zone of severe damage as well as the great acreage in which there seldom is injury, the average annual damage to the rice crop inflicted by blackbirds probably does not exceed 1 per cent of the yield. Although such an estimate might appear to minimize the importance of this problem, it must not be overlooked that the great bulk of the damage inflicted is confined to a limited area, and in that area rice growers have suffered severe losses. It was with the object of remedying conditions there that experiments in blackbird control were carried out.

Wandering Flocks

"Blackbirds are nomads. Daily they make trips to and from their feeding grounds in the ricefields and their roosts in the marshes. Sometimes their flocks number tens of thousands, and, with an ample food supply before them, may be found here on one day and, on the following, miles away. At times, however, they will persist in levying toll on particular fields and may be found day after day in one section. Suddenly they may leave, and, like a tornado, strike at some distant point. Unlike a colony of field mice, ground squirrels, or other rodent pests that always are to be found not far from their runways or burrows, the presence of blackbird flocks cannot be predicted with certainty. This is especially true during the ripening period and the harvest, when there is food to be had everywhere. Even during planting season, when the natural food supply is at its low-

est ebb, and the newly seeded ricefields are the principal attraction to the birds, their uncertain wanderings prevent the carrying out of consistently successful control measures.

Control by Use of Poison.

"There is little difficulty in killing a certain number of the birds through poisoning operations at planting time, a practice that has been followed for years by some of the borderline rice growers. As a basis for a material reduction in the resident blackbird population of the Gulf Coast area, however, poisoning has proved to be an uncertain and expensive undertaking. Not only do the wandering habits of the birds often result in baited areas wholly overlooked, but experiments have shown that wherever an appreciable number have been killed, the frightening effect produced tends to drive away the remaining birds. In this manner success works against future success in the same area, necessitating a constant shift in the scene of operations. Periods of rain, so frequent in the Gulf Coast region during the spring months, also must be reckoned with, since not only does a hard downpour bury or wash away much of the bait, but its poisonous qualities also are destroyed. Rains at intervals of three or four days or a week, easily may completely frustrate poisoning operations during the entire planting season through the destruction of baits.

"It is because of these obstacles that the Biological Survey does not favor the inauguration of a systematic anti-blackbird campaign throughout the Gulf Coast area to remedy a situation that is admittedly serious in a narrow zone along the southern border of the rice belt. Farmers living in this zone can obtain a certain degree of relief from damage at sprouting time through the frightening effect of poisoned baits. Even when distributed at planting time, which normally is about 10 days previous to the sprouting period, poisoned baits may exert a deterrent effect that will last until the sprouts begin to appear. This is quite likely to be the case if a number of neighbors carry out such measures simultaneously. It also may happen that the distribution of baits in late-planted fields will, by driving the birds away, result in the protection of neighboring fields that are sprouting. To such an extent the use of poisoned baits may be adopted to advantage by individual farmers or groups of farmers.

"During the growing and ripening periods and while the crop is in the shock, poisoning is utterly futile.



The red-winged blackbird the principal
rice destroyer

At these times bird minding with the shotgun is the commonest and, though expensive, nevertheless the most satisfactory course to follow.

Preparing and Distributing Poisoned Bait.

"For those farmers who wish to avail themselves of the deterrent effect of poisoned bait, the following directions for preparing it are given:

"The process is a simple one, rough rice being soaked in a solution of strychnine sulphate. The resultant bait should contain 1 ounce of strychnine to every 10 quarts (dry measure) of rice. This can be prepared by dissolving 1 ounce of strychnine sulphate

(either crystals or powder) in $2\frac{1}{2}$ quarts of boiling water. Pour this over 10 quarts (dry measure) of dry rough rice and stir until the entire mass of grain is thoroughly wet. If this is done in an old milk can or other container with a tightly fitting cover it can be turned over and otherwise agitated every two or three hours or when convenient. At the end of 24 hours it will be found that practically all the solution has been absorbed. Bait of this strength closely approximates that which has been used for years by some of the French-speaking rice growers of Louisiana, who have been accustomed to using $\frac{1}{8}$ ounce of strychnine to every gallon of rice. It not used immediately the grain may be spread out to dry. In any event, **the bait should be kept out of the reach of children, irresponsible persons, and livestock.**

"It is difficult to prescribe the proper quantity of bait to distribute. Frequently the planter has a few quarts of bait beside him as he rides the drill, and scatters a little of it now and then as he circles the field. Distributing the bait afoot, as a separate operation after the field has been drilled, will involve extra labor, but it will insure a more satisfactory distribution, as it is easier to avoid areas of rough ground in which much of the grain would disappear beneath clods of earth. By dropping the bait in the smooth wheel tracks of the drill, little will be lost. To cover a field satisfactorily it will be necessary to scatter such lines of bait at intervals of 25 or 30 feet. The grain may be allowed to filter slowly through the fingers as the farmer walks at a moderate pace. When scattered in this manner about five quarts of bait will be needed to the acre."

BIRD BANDING

The most interesting research of recent years into the habits of our wild birds has been that of bird banding, which has been dubbed "the telltale of migratory flight," by Dr. E. W. Nelson, former chief of the Bureau of Biological Survey, in the United States Department of Agriculture. It has proved to be an efficacious and modern method of learning the flightways and habits of birds, and in the returns secured by the Federal Bureau, Louisiana has played an important part in the taking of the banded birds.

Out of an approximate quarter of a million birds that have been banded, over 10,000 bands have been

returned to Washington in the past three years, and migratory waterfowl, particularly the ducks, have furnished most of the returns, a fact that Frederick C. Lincoln, who is in charge of this work, claims is readily explained because of the countless number of sportsmen who are in the field during the annual hunting seasons. As Louisiana is host to such a large number of migratory game birds each winter it is reasonable that this State can furnish reliable data in searching out facts concerning bird flight.

The Department of Conservation, as well as sportsmen and other citizens of Louisiana, has cooperated with the biological survey in forwarding to Washington bands taken from birds secured in this State. Frequently those who have been hunting will kill a bird bearing on one leg a small aluminum band bearing a serial number and the words "Bio. Sur." When such a band is sent to this office it is in turn mailed to Washington. The number on the band is looked up in the records and the place and date of banding is ascertained and the bander as well as the taker is notified by card.

From such reliable data some very interesting facts concerning the flight of birds has been secured. Birds that have been banded in Germany have been recovered in America; a common tern banded in Maine has been recovered in British West Africa; a robin banded in Minnesota was taken in southern Mexico; a cormorant banded in Quebec, Canada, was taken in the Canal Zone; a snowy heron banded in Utah was taken six years later in Central Mexico, and a white pelican banded in the Yellowstone National Park was killed in Vera Cruz, Mexico. A pintail duck banded at Avery Island, La., February, 1922, was recovered at Matamoros, Mexico, October, 1926.

The dispersal of the waterfowl, such as wild ducks and geese, is of great importance to Louisiana hunters. A movement a year ago to cut the existing bag limits and institute rest days because of a pronounced mortality among the wild ducks and geese of the western part of the United States, was not put into effect because the

returns from bird banding showed that the western birds, whose breeding grounds were being limited by droughts and drainage, did not migrate to the eastern State of Louisiana during the winter months. Therefore the great Mississippi Valley flight was not affected by breeding ground conditions in the Bear River Marshes of Utah or the Bison Range of western Montana.

It is urged by this Department that full cooperation be given the Federal Government in its work of securing this valuable data. Any one taking a bird bearing a band on its leg should either send it directly to the Bureau of Biological Survey, Washington, D. C., or send it to the Department of Conservation at New Orleans. Notification of its receipt, together with information where the bird was banded will be given to those securing such banded birds.

Banded birds taken in Louisiana have been reported from various sections of the State and, as the following references will show, they had been banded in various parts of the continent.

Four herring gulls, birds that do not breed in Louisiana, have been secured. One taken on the Chandeleur Islands had been banded the summer before in Michigan; two banded in Wisconsin were taken the following winter, one at Newellton, Tensas Parish, and the other near New Iberia. The fourth bird had been banded during June at the Straits of Mackinaw, Mich., and during the middle of December of the same year was recovered at Abbeville.

Caspian terns, banded in Michigan, were recovered in this state 2 and 3 years after banding. One banded at Gravelly Island, Mich., July 21, 1925, was recovered at Des Allemandes, August 25, 1926. Another banded at the same locality, July 23, 1924, was taken at Buras, January, 20, 1926. A third, from the same banding station, banded July 21, 1925, was taken at Delta Farms, November 30, 1926. Another Caspian tern, banded at St. Jones, Mich., in July of 1923, was not recovered until it was taken at Houma, January 7, 1925. Another bird of this species, banded at Green Bay, Wis., in the

Louisiana possibilities and the general manager of this foremost fur farm, M. S. Bangs, visited Louisiana and purchased two large tracts of muskrat land, one of 9,500 acres in Vermilion parish, and another of 54,000 acres in Plaquemines parish on the west bank of the Mississippi River. This concern has gone into the 'rat ranching business on a large and thoroughly modern scale. It has not attempted to take any animals off its holdings, preferring to let the land "come back" naturally and at the lowest expense. This division has cooperated with the Mt. Forest officials in every way possible by giving advice on operations, forms of buildings, biological research, and identification of food grasses. This concern plans adding to its already large Louisiana muskrat land holdings and the expressed intention of the officials is to center the muskrat industry, as far as numbers are concerned, in this state.

Flood Damage to Delacroix Island.

During the flood period of 1927, the director of this division was called upon by the reparations committee of the City of New Orleans to make a survey of the areas in Plaquemines and St. Bernard parishes inundated by the Caernarvon artificial crevasse and decide whether damage was done the trapping industry of this particular section. The matter proved to be a very delicate one, calling for a great deal of careful and personal research. Accurate data was secured on the ground, the revival of the food grasses watched, the disappearance of the muskrats and other fur animals noted, and figures, in the form of sworn affidavits, were secured from the trappers of that region. In the early fall sufficient information was secured to justify the director of this division to report to the commissioner of conservation that the fur industry in a certain specified area of the two parishes had been damaged 100 per cent for the 1927-28 trapping season.

As the area had produced in excess of 2,000,000 muskrats the winter before the inundation, and muskrats were valued in excess of \$1.50 a pelt, it can be easily surmised that the task was not an easy one for

the person designated to make the decision that called for such a great amount of damages to be paid by the City of New Orleans. The matter was finally adjusted and the trappers and land owners most affected were awarded, and accepted, damages to the amount of \$1,500,000.

When the 1927-28 trapping season was at hand this division recommended to the conservation commissioner that he declare an emergency close season on the entire area flooded by the Caernarvon crevasse waters. A meeting of those most concerned was held by the commissioner but an overwhelming majority of trappers attending voiced their opposition to the very necessary conservation move, declaring they would trap any muskrats that might have returned to the marshes if they, the trappers, were not granted reparations. As this meeting was called before the settlement of the flood claims, and as the department of conservation had nothing to do with reparations, or the actions of that committee, the commissioner wisely refused to order the emergency close season on the grounds he must have the moral and active support of those most interested—the trappers of that region,—if the close season could prove effective.

Rehabilitation Research.

In the spring of 1928, upon the request of the president and vice-president of the Acme Fur and Land Company, whose lands are acknowledged to be the most fertile fur producing marshes in this country, and who were the principal sufferers from the effect of the blasting of the Caernarvon levee, this division agreed to cooperate with this company in establishing a combined fur experimental farm and research area on the famed Delacroix Island marshlands. This work has already been started. Under the terms of the agreement with the commissioner of conservation, William A. Walsingham and Manuel Molero, the president and vice-president of the Acme Land and Fur Company, are to finance the work and the department furnish the ex-

perience, technical knowledge and scientific research, through the wild life division.

The first act was to issue permits to experienced trappers to take live muskrats in the outlying marshlands not affected by the flood waters and transport them back to the center of the area that had been covered by a sheet of flood waters. Under the able direction of the Acme company's general field manager, John C. Durham, a large corps of trappers, provided with Gibbs' live traps, took between two and three thousand live and unhurt muskrats and successfully planted them on the interior marshes. This was probably one of the most important conservation movements ever attempted for the upbuilding of the fur animals in the United States.

Fencing, of the latest and most improved kind, has been ordered and by the end of May it is expected that the experimental muskrat plots will be in full swing. There will be three major units in the initial experiments; a one-acre tract, a quarter-acre tract, and a one-tenth of an acre tract, fenced with 16 gauge one inch mesh wire. These fenced plots will, it is expected, give accurate data as to how many muskrats to an acre can be reared in natural conditions, as the plots will be placed in the natural marsh and no efforts will be made to feed the 'rats outside of the natural foods the Louisiana marsh provides. In this way we will learn just how many 'rats per acre can be counted on through 'rat ranching.

Individual pens will be built so that the life history of the muskrat can be studied, and the productive habits of mink and raccoon, and other fur animals, as well. The research work that will be carried on in this particular section is believed by the director of this division to be of the utmost importance as this land has shown itself to be the most productive, acre for acre, of any marshland in Louisiana and, for the amount of muskrats that it has produced, year in and year out, in flood year or in drought periods, it has proved a veritable gold mine for the large numbers of trappers living in that region, many of whom now own their own acreage

or are acquiring it through the fruits of their trapping operations every winter.

From the sworn affidavits of the trappers, whose trapping activities were stopped by the Caernarvon crevasse, it was ascertained that the St. Bernard marshes of the Delacroix Island section averaged 31.11 muskrats to the acre during the 1926-27 season, and the Plaquemines marshes of the same section averaged exactly 35 muskrats to the acre. One trapping area in St. Bernard parish of 128 acres, according to an affidavit, yielded 9,440 muskrats, or a take of 73.82 muskrats to the acre. One tract of 80 acres yielded a Plaquemines parish trapper, according to this affidavit, 6,000 muskrats or an average of 75 to the acre.

The two examples mentioned above are the high scores from the two parishes in that section and must not be considered as the yield on all acreage in that territory. An analysis of the figures found on the sworn affidavits indicated that the St. Bernard marshes of the Delacroix Island territory showed 481,053 muskrats being taken off of 15,462 acres, while the Plaquemines parish marshes, reporting on 20,174 acres, showed a total take of 713,939 muskrats.

From past personal knowledge, and from the figures presented by the individual trappers in their affidavits, the director of this division has no hesitancy in stating that there is no area in the State of Louisiana, or anywhere else on the North American continent, that can compare with the Delacroix Island section as a fur producer, whether the fur be that of a muskrat or a more-valuable-per-pelt fur animal. Previous floods have not been able to wipe it out and it can be confidently asserted that within two years, if the area is properly guarded, that it will be back to the same producing strength it exhibited in 1926-27, four years after a crevasse had covered its marshes with a yellowed Mississippi river flood.

Financial Statement

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—SPECIAL ACCOUNT

RECEIPTS

January 1, 1926, to January 1, 1927

Severance Tax Shrimp.....	\$ 13,648.26
Interest on Daily Balances.....	431.31
Scientific Collection Certificate.....	9.00
Fishing and Freighting Vessels.....	2,587.50
Bedding Ground Rents.....	12,464.00
Sand, Gravel and Shells.....	35,653.85
Privilege Tax.....	19,448.10
Salt Water Fish and Shrimp License.....	12,397.50
Fresh Water Fish and Seine License.....	11,436.12
Dredge and Scraper License.....	7,700.00
Resale and Shipping License.....	8,723.00
Fish Dealers' License.....	1,484.90
Fur and Hide.....	13,896.81
Hunting License.....	106,404.51
Commissions Refunded.....	318.04
Transfer of Leases.....	27.00
Game Breeders' License.....	30.00
Diamond Back Terrapin License.....	275.00
Cold Drink Concession Beechwood Hatchery.....	3.00
Steam Box License.....	100.00
Shop License.....	10.00
Buying, Shipping and Selling Frogs.....	255.00
Hunting Club Permits.....	215.00
	\$247,517.90

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Withdrawals State Appropriation.....	\$203,500.00
Refunds to Sheriff.....	265.05
Transfer to General Fund.....	106,686.83
	\$310,451.88

RECEIPTS

January 1, 1927, to January 1, 1928

Severance Tax Shrimp.....	\$ 13,458.44
Interest on Daily Balances.....	241.92
Fishing and Freighting Vessels.....	1,868.50
Bedding Ground Rents.....	24,122.55
Sand, Gravel and Shells.....	43,687.05
Privilege Tax.....	22,169.12
Salt Water Fish and Shrimp License.....	14,870.00
Fresh Water Fish and Seine License.....	10,735.10
Resale and Shipping License.....	1,520.00
Dredge and Scraper License.....	5,581.50
Fish Dealers' License.....	1,940.00
Hunting License.....	102,508.27
Commissions Refunded.....	395.21
Transfer of Leases.....	17.00
Game Breeders' License.....	80.00
Diamond Back Terrapin License.....	325.00
Steam Box License.....	300.00
Shop License.....	30.00
Buying, Selling and Shipping Frogs License.....	2,630.00
Hunting Club Permits.....	260.00
Fines Collected.....	5.00
Refund a/c overpayment to Fur and Hide Division.....	1,266.10
Fresh Water Shipping License.....	6,745.00
Refund Fish, Game and Oyster Division over-Draft.....	86.73
	\$254,842.54

DISBURSEMENTS

January 1, 1927, to January 1, 1928

Withdrawals State Appropriation.....	\$217,159.75
Fresh Water Fish and Seine License Returned.....	8.00
Tax transferred to Fur and Hide Division.....	1,409.82
	\$218,577.57

SUMMARY

January 1, 1926:	
Balance in hands of State Treasurer.....	\$ 74,857.19
January 1, 1926, to January 1, 1927, Revenues.....	247,517.90
	\$222,375.09
January 1, 1926, to January 1, 1927, Disbursements.....	310,451.88
Balance	11,923.21
January 1, 1927, to January 1, 1928, Revenues.....	254,842.54
	\$266,765.75
January 1, 1927, to January 1, 1928, Disbursements.....	218,577.57
January 1, 1928, Balance in hands of State Treasurer.....	\$ 48,188.18

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—REGULAR ACCOUNT

RECEIPTS

January 1, 1926, to January 1, 1927

Interest on Daily Balances.....	\$ 467.11
Contingent Funds Returned.....	6,306.82
Insurance a/c Loss and Damage of Equipment.....	1,000.00
Miscellaneous Refunds.....	1.30
Sale of Confiscated Furs.....	1,318.35
Salary Adjustments.....	4,532.38
State Appropriation.....	228,000.00
Sale of Old Equipment.....	2,348.00
Sale of Launch "Hawk".....	25.00
Freight Refunded.....	11.64
Expense Refunded.....	6.67
Forestry Division Account.....	4,887.07
Pro-rata Office Expense and Supplies.....	2,951.17
Minerals Division.....	3,830.85
Loan Board of Liquidation.....	50,000.00
Refund Agents' Expense and Supplies.....	25.00
Refund Office Expense and Supplies.....	447.91
Overage in Petty Cash.....	24.13
Suspense Account.....	13.00
Deposit of Petty Cash Account.....	250.00
Fur and Hide Division Refund.....	7,175.76
Wild Life Refuge Account.....	897.75
Public Shooting Grounds Refund.....	2,000.00
Purchase of Launch "Dixie Flyer".....	5,000.00
N. S. F. Checks, Paid.....	28.66
	<u>\$321,548.57</u>

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Contingent Funds.....	\$ 5,318.94
Postage.....	1,310.21
Forestry Division.....	2,596.56
Minerals Division.....	937.45
Public Shooting Grounds.....	4,284.99
Wild Life Refuge Account.....	1,475.89
N. S. F. Checks.....	115.73

RECEIPTS

January 1, 1927, to January 1, 1928

Interest on Daily Balances.....	\$ 221.23
Contingent Funds Returned.....	1,776.63
Insurance a/c Loss and Damage of Equipment.....	342.50
Salary Adjustments.....	1,545.44
State Appropriation.....	217,159.75
Sale of Old Equipment.....	217,390.00
Forestry Division.....	1,534.42
Pro-rata Office Expense and Supplies.....	14,047.00
Minerals Division.....	25,671.94
Fur and Hide Division Refund.....	18,319.34
Wild Life Refuge Account.....	234.04
N. S. F. Checks, Paid.....	25.00
Angling License Fund.....	6,544.96
Sale of Confiscated Goods.....	553.41

DISBURSEMENTS

January 1, 1927 to January 1, 1928

Contingent Funds.....	\$ 3,654.00
Postage.....	1,131.34
Forestry Division.....	3,190.95
Minerals Division.....	1,918.90
Public Shooting Grounds.....	6,085.66
Wild Life Refuge Account.....	692.54
N. S. F. Checks.....	92.81
	<u>\$288,365.66</u>

a day and when a large body of water is encountered they go around it rather than cross it.

The night migrants include all the great family of warblers, the thrushes, flycatchers, vireos, orioles, tanagers, most of the native sparrows, the greatest migrants of them all, the members of the shorebird family. According to Cooke, they usually begin their flight soon after dark, end it before dawn and go farther before than after midnight. Night migration probably causes more casualties among the birds than if they made the journey by day but this is wholly a matter of food supply.

The Birds' Gasoline Supply

Let us take the tiny humming bird as an example. It feeds all day here in Louisiana, in our New Orleans gardens, for instance; if, then, it waited until tomorrow morning to make its 500 to 700-mile flight across the Gulf of Mexico, it would land on the Mexican coast at nightfall and, after such an exhausting flight, would have to wait until day after tomorrow morning to feed. This would mean it would have to be 36 consecutive hours without food, whereas by a night migration the same journey is performed with only a 12-hour fast. Food, it must be remembered, is very necessary for bird migration across large bodies of water. Before essaying such a journey the birds "eat and grow fat", for the fat thus stored beneath its skin is the bird's gasoline. When it lands it is frequently "very poor"—its gasoline supply, if we may use the simile, has been exhausted and it must land and secure an additional supply—just like an aviator is compelled to come to earth for more gas.

Professor Wells W. Cooke, probably the greatest student of bird migration who has ever studied the problem and the interesting facts connected with it, ascertained that migrating birds do not fly at their fastest and satisfied himself that the migration speed is usually from 30 to 40 miles an hour and rarely exceeds 50 miles. The migration flights, over land, consist of a

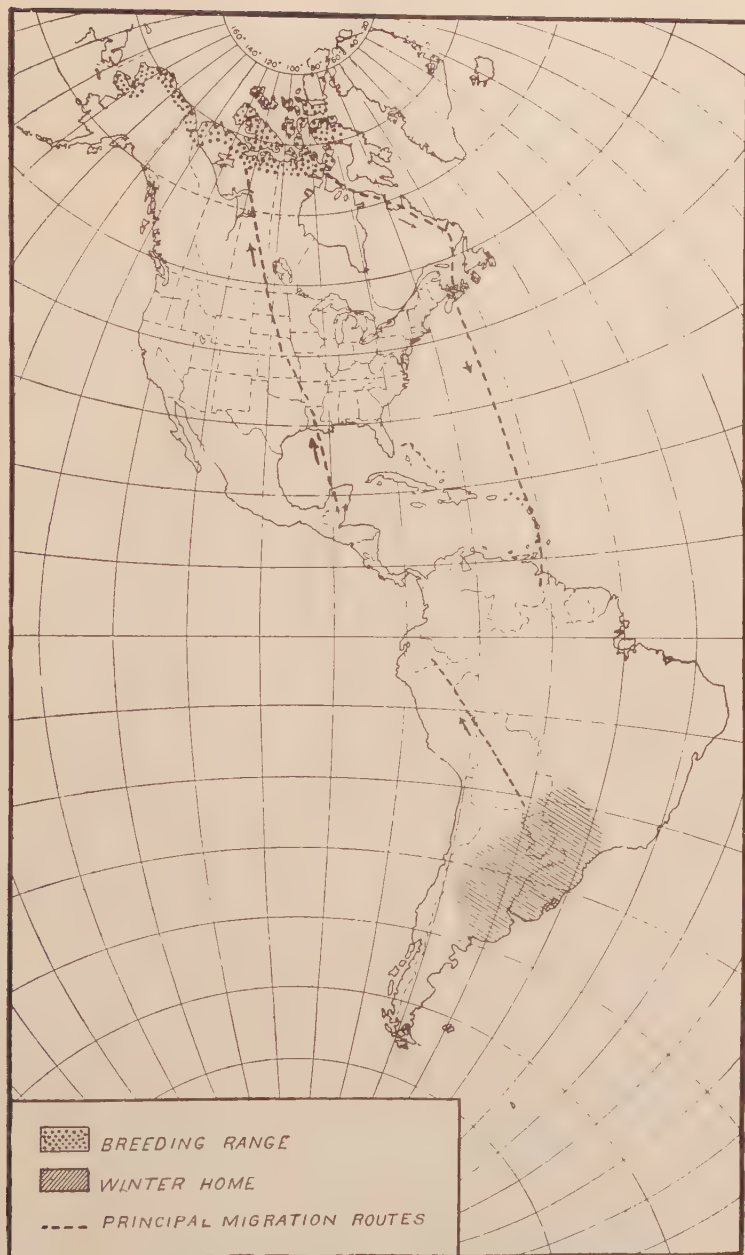
few hours a night, alternating with rests of one or more days. In 1884 the purple martin flight from New Orleans to Lake Winnipeg was made in 12 nights at an average speed of 120 miles a night. Yet we know that they can go faster for they cover the five to seven hundred mile single, non-stop flight across the Gulf in a single night.

The World's Champion Flyer

The landbird with the longest migration route is the nighthawk, which occurs north to the Yukon and south, 7,000 miles away, to Argentine. But even this distance is surpassed by some of the waterbirds and especially some of the shorebirds. Nineteen species of shorebirds breed north of the Arctic Circle, every one visits South America each winter, six of them penetrating to Patagonia, thus giving these six species a migration route of more than 8,000 miles, and to one is given the palm for being the greatest of all the flyers as it makes in its direct, non-stop flight from Nova Scotia to northern South America, 2,400 miles in about 48 hours. In the spring it returns via a 700-mile hop across the Gulf landing on the shores of ever hospitable Louisiana on its way north as shown by the chart opposite.

As can be determined by the map on page 271, Louisiana is important in bird migration, being in the center of the most favored route that many long-distant fliers choose in going to South America. In the spring Louisiana is the first land encountered in the reverse flight across the blue-green Gulf of Mexico and along our coast we have many favored localities where these tiny Lindberghs of the air alight and rest and feed before continuing their northward journey.

Grand Isle is one such "migration station", as these places are called, and for the past three spring seasons E. S. Hopkins, field naturalist of this division has been making a check list of the number of species of birds that come to this small islet on the edge of the Gulf. The data Mr. Hopkins has secured, which includes the



THE WORLD'S CHAMPION MIGRANT

The golden plover nests in the far north and in the fall flies over the ocean from Nova Scotia to northern South America, 2,400 miles without stop—the longest known flight of any bird and in spring it returns via Louisiana and the Mississippi Valley having a migration route from Arctic America to the Argentine of 8,000, or a round trip of 16,000 miles.

dates of arrival of the different birds, will undoubtedly prove of great value to students of bird life throughout North America. His report on his observances during March, April and May of 1927 follows:

Bird Migrants on Grand Isle

Grand Isle is a small island forming a part of the Louisiana coast line, sixty-two miles directly south of New Orleans. It is low and sandy, averages from a half to one mile in width and is seven and one-half miles long. It is scarcely different in elevation from the vast expanse of marsh that lies north of it, but owing to the soil and the occupation of the island by man, considerable tree growth covers certain portions of the land together with a number of shrubs.

This strip of land has been noted for years as a place where many migrants, crossing the wide Gulf of Mexico, end their flight over the water and rest and feed before proceeding northwards. To date no systematic effort has ever been made to list the birds arriving there nor have any notes ever been set down or published giving the approximate dates of arrival on the northward flight.

The tree growth on Grand Isle is most interesting. Originally it was merely an ordinary Louisiana gulf coast *chenier*, as any oak-grown ridge is called by the French-speaking inhabitants. Here the live oaks (*Quercus virginiana*) grow in profusion in the central section of the island, other trees that have been noted, but with no intent to list the complete flora, are: Black mulberry, (*Morus rubra*); white mulberry, (*M. alba*); hackberry, (*Celtis laevigata*); honey locust, (*Gleditsia triacanthos*); tamarisk (*Tamarix articulata*), this is known as the "smoke tree" on the island and is the East Indian salt tree; false acacia, (*Robinia pseudo-acacia*); China-ball tree, (*Melia azedarach*); pecan, (*Hicoria pecan*); persimmon, (*Diospyros virginiana*); wax myrtle, (*Myrica cerifera*); may-haw (*Crataegus opaca*); prickly ash, (*Xanthoxylum clava-herculis*); Spanish bayonet, (*Yucca filamentosa*); camphor tree, (*Cinnamomum camphorum*); privet, (*Ligustrum macrophyllum*); palm, (*Washingtonia filamentosa*); date palm, (*Phoenix canariensis*); scrub palmetto, (*Sabal megacarpa*); oleander, (*Nerium oleander*), and a number of other trees and shrubs.

As the island is inhabited and considerable agriculture is carried on by those living there, naturally a great many novelties among the trees and shrubs have been planted, but native or exotic, the birds patronize all without favor or particularity, feasting either on the fruits or the insects found on the luxuriant growth. In the cultivated fields are to be found growing cucumbers, stringbeans, and such truck. Among these plants the insectivorous birds, as well as the seed-eaters, find food in plenty after they have completed their hazardous journey across the treacherous gulf waters.

Under instructions of the director of the division of wild life I made the first migration survey in 1925, and in 1926 made a second trip to Grand Isle during the height of the migration period. Other duties prevented a survey in 1927, but for the 1928 season it is expected that the greater part of three months can be spent on the island profitably.

When weather over the gulf is calm the birds making the flight reach the first landing place in what appears to be a robust condition, but if heavy weather develops during their aerial journey and the migrants have to battle the winds for several hours, they reach the island in an exhausted condition. Some are too wind weary from the buffeting they received en route to recover from the ex-

perience, and it was not an infrequent occurrence to find many of the little feather travelers lying dead on the sands of the land they had finally reached.

Normally the birds, after reaching the safety of Grand Isle, spend a few days flitting about the landing place feeding and resting before they start on their overland trip to their nesting destination. As a rule, however, the flying trip over the blue-green waters of the turbulent gulf has its effect on the spirits of the migrants and the absence of bird notes while the different species cover the island is characteristic. I recall once hearing the call of the Yellow-billed cuckoo and the twittering of the female Baltimore oriole, otherwise there was no sound from the winged visitors. All of this was in marked contrast to the vocal outpourings of the resident birds of the island, the mockingbird, cardinal, Carolina wren, red-winged black-birds and boat-tailed grackles.

In the following annotated list I have set down all of the birds observed during my stay on Grand Isle. Some, it will be noted, are residents and should not be confused with the truly migratory species, and to this end I have indicated such residents or non-migratory birds with an asterisk (*) this mark will also serve to identify such wintering migrants or visitors that are not concerned, to any great extent, at least, to the migratory flight across the Gulf of Mexico.

The list includes 104 species.

Herring gull (*Larus argentatus*). Winters at Grand Isle and all along the Louisiana coast. A large number of these birds are always seen, with other northern breeding gulls, in this section.

Ring-billed gull (*Larus delawarensis*). A wintering gull like the herring gull.

*Laughing gull (*Larus atricilla*). This is the only gull that breeds in Louisiana, and while many of these birds leave the Louisiana coast in wintertime, many of the species are with us the year around.

*Royal tern (*Sterna maxima*). Very common, as it is a breeder on the entire Louisiana coast in summer and most of the birds remain on the coast during the entire winter.

*Cabot tern (*Sterna sandwichensis acufiorida*). While a resident this tern is not as common as the royal at this time of the year (April). In other respects it remains here quite like the other terns.

*Forster tern (*Sterna forsteri*). This beautiful bird, called the sea swallow, as all the small terns are, has reached its height of plumage in April. It breeds in May and June on islands where the grass has been piled up by the waves and nests are found with three to four eggs.

*Black skimmer (*Rynchops nigra*). Found in great numbers on east end of island; it also breeds on our coast, making its nest in shells piled up by the waves.

*Mexican cormorant (*Phalacrocorax vigua mexicanus*). Seen in great numbers, it is called by the natives of the marsh lands "nigger goose." It breeds in the state.

White pelican (*Pelicanus erythrorhynchos*). A winter visitor, arriving here about October and departing about April, breeding in the north. A few breeders remain during the summer. Observed quite a few April 29th, 1925.

*Brown pelican (*Pelicanus occidentalis*). This, the emblematic bird of Louisiana, needs very little description. It breeds in great number along our coast, nest being placed upon the ground or small bush, where three to four large white eggs are laid. It remains here throughout the year.

Man-o-war-bird (*Fregata aquila*). This master of the air is along the Louisiana coast in great numbers in the summer. When

our gulls and terns are nesting it prefers to rob them rather than fish for food. Observed two on Grand Isle on April the 22nd, also collected one on December 3rd at the mouth of the river, a young male, so no doubt they are found here the year around, but the numbers are augmented during the summer.

*American merganser (*Mergus americanus*). Quite common in the waters of Bay Barataria, just north of the island, all through the winter and large flocks remain in these waters until late in April.

*Red-breasted merganser (*Mergus serrator*). Very common in the waters around Grand Isle all during the winter months. Like the American, this species gathers in very large flocks and it does not seem to like to leave on the northward migration until late in April. This merganser, as well as the American, is best known by its local name of *bec-scie* (saw bill), the red-breasted is called a sea *bec-scie* or *bec-scie de mer*, in recognition to its habit of keeping to the seas or other large water bodies.

*Summer mallard (*Anas fulvigula maculosa*). This is the common breeding mallard of Louisiana. There seems to be a good deal of confusion as to whether this is *A. f. fulvigula*, or the so-called mottled mallard, *A. f. maculosa*. Whichever it is, several pairs regularly resort to the marsh areas of Grand Isle to mate and rear their ducklings. This marsh is on the east end of the island and one nest found contained six eggs, all seemingly in an advanced stage of incubation.

*Blue-winged teal (*Querquedula discors*). Observed many of this species but did not find any nesting on Grand Isle, although they do nest in Louisiana. The last seen in 1926 was on May 3, and a large number were observed April 2, 1928.

Note: In this list only the summering ducks are mentioned. It must be remembered that this section of Louisiana is noted for the wintering wild waterfowl, especially the wild ducks, and practically every species is to be seen here during the colder months of the year.

*Little blue heron (*Florida caerulea*). While on the beach in the early morning of April 8, 1926, we observed small flocks of birds, flying very low over the water, arriving from the south. They proved to be Little blue herons, many in their juvenal or "crazy" or "calico" plumage of mixed white and blue feathers. These birds were completely exhausted on arrival and sought the ground and low trees immediately on arrival. In 1928 we found that these herons arrived in small flocks, mostly adults, from March 31 to April 8.

Green heron (*Butorides virescens virescens*). Found in great numbers during migration. By April 5, when most of the birds began arriving from over the gulf, they were in full plumage. After April 10 they become scarce and the first observed in 1928, six birds, were on the island March 31. The height of the migration seems to be on or about April 10.

Black-crowned night heron (*Nycticorax nycticorax naevius*). Several first observed and collected April 6, 1926.

Yellow-crowned night heron (*Nyctanassa violacea*). In 1926 the first seen were on April 5 and 8, both were in high plumage. The first to arrive in 1928 were observed April 1.

*Louisiana clapper rail (*Rallus crepitans saturatus*). Very common on the island, where it breeds.

Virginia rail (*Rallus virginianus*). One specimen observed and collected April 8, 1926.

Sora rail (*Porzana carolina*). A number observed in April.

Yellow rail (*Coturnicops noveboracensis*). Several observed but as they are difficult to flush only a few collected, viz. April 8, 1926; two March 26, 1926, one April 4, 1926.

Purple gallinule (*Ionornis martinicus*). One found dead on

beach March 26, 1926. Collections April 7, 1925, April 4 and 8, 1926.

Snipe (*Gallinago delicata*). Quite common all through April. This bird is a characteristic winter visitor to the island.

Long-billed dowitcher (*Macrorhamphus griseus scolopaceus*). Several flocks of these shore birds observed during April. Collected six April 5, 1926.

Pectoral sandpiper (*Pisobia maculata*). Quite common by April 8, 1928, also common during April of 1926.

Least sandpiper (*Pisobia bairdi*). Large flocks of these diminutive shorebirds are to be found on Grand Isle all through April.

Red-backed sandpiper (*Pelidna alpina sakhalina*). Very common on the east end of the island.

Sanderling (*Calidris leucophaea*). During the winter months this characteristic bird of the surf sands is very common. Large flocks remain until late and small flocks are to be seen through the summer but are, of course, non-breeders.

Greater yellowlegs (*Totanus melanoleucus*). Not at all common. Collected one April 10, 1925.

Lesser yellowlegs (*Totanus flavipes*). This yellowlegs is quite common all through April, 1925 and 1926. In 1928 there were very few to be seen at the same early dates in April.

Spotted sandpiper (*Actitis macularia*). Not as many seen as expected. Collected a male April 7, 1925. One April 26, 1926. None observed up to April 8, 1928.

Long-billed curlew (*Numenius americanus*). Several large flocks observed April 8, 1925, but unable to collect any because of their extreme shyness. When in the marsh feeding they always seemed to have a very alert lookout. Saw 20 "Corbigeau," as the French-speaking natives know them, April 22, 1926, and collected one. A number observed April 7, 1928.

Black-bellied plover (*Squatarola squatarola*). Quite common on the mud flats when the tide is out. Collected two April 12, 1926.

Golden plover (*Charadrius dominicus dominicus*). Flocks of this long-distant migrant observed April 16, 1926, and April 28 and 29, 1925. None seen in 1928 up to April 8.

*Wilson plover (*Ochthodromus wilsonius*). Very common on Grand Isle, where it breeds and remains the year around. Collected three eggs April 1, 1928. Eggs have been collected on all previous trips.

Ruddy turnstone (*Arenaria interpres morinella*). Observed a number of these birds and collected male April 8, 1925. Saw many in 1926 but none have appeared in 1928 up to April 8.

Turkey vulture (*Cathartes aura septentrionalis*). Very common at all times.

Swallow-tailed kite (*Elanoides forficatus*). Four specimens of this beautiful bird seen April 18, 1925, and one collected. One was observed April 11, 1926.

Mississippi kite (*Ictinia mississippiensis*). Observed two April 6 and April 22, 1925, one April 12, 1926.

Red-tailed hawk (*Buteo borealis*). One specimen observed April 17, 1925.

*Bald eagle (*Haliaeetus leucocephalus leucocephalus*). The national bird was observed watching a fishing osprey April 22, 1925. They both moved from sight, soaring in an easterly direction.

Duck hawk (*Falco peregrinus anatum*). One of these pirates of the air was observed all through April of 1926. Although on the lookout for prey, it was shy enough to prevent me from collecting it.

Another, or perhaps the same individual, was seen April 1, 1928, in the same general territory.

Pigeon hawk (*Falco columbarius columbarius*). One specimen observed in tree on the island on April 23, 1925, two collected April 5 and 13, 1926, two April 1, 1928.

Sparrow hawk (*Falco sparverius sparverius*). This most beautiful of small hawks was common on island at all times.

Osprey (*Pandion haliaetus carolinensis*). One specimen observed April 22, 1925.

Barn owl (*Aluco pratincola*). Quite common on the island. Breeds in trapper's camps that are deserted in the spring and summer months.

Burrowing owl (*Speotyto cunicularia hypogaea*). Two of these visitors were collected on March 31 and April 6, 1926. Saw one on April 1, 1928.

Yellow-billed cuckoo (*Coccyzus americanus americanus*). This bird very common from date of arrival to first of May. Observances: April 3, 1926, common by April 10. First seen March 31, 1928.

Yellow-bellied sapsucker (*Sphyrapicus varius varius*). Observed one April 7, 1925. Female April 10, 1926, first seen.

Chuck-wills-widow (*Antrostomus carolinensis*). We heard the call of this bird on May 7th but did not see same.

Florida nighthawk (*Chordeiles virginia chapmani*). Found this bird on my return to the island April 17, 1925, very common. One of the men informed me that he had observed it on April 12th. Collected fresh eggs on May 4, 1925. One observed March 31, 1926, and many on March 12 and 15, common by March 16.

Chimney swift (*Chaetura pelagica*). This bird first observed April 22, 1925. Two seen March 26, 1926, common by April 10. In 1928 three seen March 3, and two April 2.

Ruby-throated hummingbird (*Archilochus colubris*). May 2, 1925, was clear and cool. About twenty of these little birds were around a flowering bush near our house. They disappeared about noon and we only saw a few stragglers during the remainder of our stay. A large flight was seen April 16, 1926. Up to April 8, 1928, none have been seen.

Scissor-tailed flycatcher (*Muscivora forficata*). This bird is said to occur quite frequently on the island in the fall, but this is the first record of the spring migration. Two were collected April 6 and 10, 1926.

Kingbird (*Tyrannus tyrannus*). This bird observed on our arrival. Breeds on island. Is very common by April 10.

Arkansas kingbird (*Tyrannus verticalis*). Observed and collected one on April 28, 1925. Collected one April 6, 1928.

Crested flycatcher (*Myiarchus crinitus*). Quite a number of these birds were observed April 20 to May 9 inclusive, 1925. One April 14, 1926, and common by April 18.

Crow (*Corvus brachyrhynchos brachyrhynchos*). A common bird scarce on this island.

*Red-winged blackbird (*Agelaius phoeniceus littoralis*). Very common. Found nest with three eggs on May 4, 1925. Many nests in construction all over the marsh.

*Meadowlark (*Sturnella magna argutula*). Very common and breeds.

Orchard oriole (*Icterus spurius*). Very common by April 6, 1926, and began nest building about May 1.

Baltimore oriole (*Icterus galbula*). This bird was scarce, as the



Laughing gulls flying in migration form

major portion of migration passed island without stopping. Observed two males May 2, 1925, and collected female on May 4.

*Florida grackle (*Quiscalus quiscula aglaeus*). Very common and breeds.

*Boat-tailed grackle (*Magaquiscalus major major*). Quite common and a breeder in the marsh back of the island.

Nelson sparrow (*Passerherbulus nelsoni nelsoni*). This bird quite common in the marshes.

*English sparrow (*Passer domesticus*). This universal pest is even found on this island.

*Louisiana seaside sparrow (*Passerherbulus maritimus fisheri*). This bird quite common and breeds.

*Cardinal (*Cardinalis cardinalis cardinalis*). Quite common on island and breeds.

Rose-breasted grosbeak (*Zamelodia ludoviciana*). This bird became quite common April 28 to May 4, 1925. Collected a few specimens. On April 16, 1926, these birds began to arrive and became quite common after that date.

Blue grosbeak (*Guiraca caerulea caerulea*). Never very common. Observed a few from April 28 to May 6, 1925.

Indigo bunting (*Passerina cyanea*). This beautiful little bunting became very common May 1 to 6, 1925, feeding on seeds behind the sand dunes. Collected two males in high plumage. April 16, 1926, first Indigo bunting were observed and became quite common after that.

Painted bunting (*Passerina ciris*). This bird very scarce. Col-

lected two males April 6 and 28, 1925. This is the common "pop" of Louisiana.

Dickcissel (*Spiza americana*). Only saw one male. Collected same on April 18, 1925. None observed in 1926.

Scarlet tanager (*Piranga erythromelas*). Observed the first April 6, 1925. Became very common by April 28. The last were observed on May 5, 1925. Two observed April 3, 1926, and April 8, common April 14.

Summer tanager (*Piranga rubra rubra*). Very common the last of April and the first of May. First observed April 10, common April 18, 1926. One March 31, 1928.

Barn swallow (*Hirundo erythrogastra*). A few observed on May 1, 1925.

Cedar waxwing (*Bombycilla cedrorum*). Quite a few flocks observed April 17 to 24, 1925.

*Loggerhead shrike (*Lanius ludovicianus ludovicianus*). Quite common and breeds.

Red-eyed vireo (*Vireosylva olivacea*). Very common from April 7 to May 4, 1925. First April 2, 1926, common after April 6. Three noted April 1, 2 and 3, 1928.

White-eyed vireo (*Vireo griseus griseus*). This species not as common as the Red-eyed, and observed during the same period.

Black and white warbler (*Mniotilta varia*). First observed on April 8, 1925. Collected male and female April 4, 1926; saw two on April 9; became common April 12, 1926.

Prothonotary warbler (*Protonotaria citrea*). Noted three on April 30, 1926, March 31 one, April 6 three; March 31, 1928, one, April 2 one.

Worm-eating warbler (*Helminthos verminvorus*). This warbler is scarce. Observed one on April 27, 1925. Collected one male on April 30, 1925, April 3, 1926, one, April 16 two.

Bachman warbler (*Vermivora bachmani*). Collected two males of this species on April 4, 1925.

Yellow warbler (*Dendroica aestiva aestiva*). Observed about ten of these birds on April 30, 1925.

Bay-breasted warbler (*Dendroica castanea*). This species very common April 30 to May 4, 1925. Collected several. This bird began to arrive April 20, 1926.

Black-poll warbler (*Dendroica striata*). Observed in small numbers. Collected one April 24, 1925, and again on April 30, male and female.

Blackburnian warbler (*Dendroica fusca*). Collected one male April 4, 1925. Observed another April 18.

Oven bird (*Seiurus aurocapillus*). First observed a male in 1925 on April 4, and on April 20 another male.

Maryland yellow-throat (*Geothlypis trichas trichas*). Observed on several occasions but not common.

Hooded warbler (*Wilsonia citrina*). Collected one male April 30, 1925. Observed a few between this date and May 4 of same year.

Redstart (*Setophaga ruticilla*). Observed three on April 30, 1925, in the oaks.

*Mockingbird (*Mimus polyglottos polyglottos*). This beloved songster of the South is very common on the island. Found twenty-seven nests by May 9, 1925, containing eggs just deposited.

Catbird (*Dumetella carolinensis*). Very common from April 20, 1925, to April 28, when they moved northwards.

*Carolina wren (*Thryothorus ludovicianus ludovicianus*). Quite a

few were observed on the island and a brood of seven found near the house on April 24, 1925.

Short-billed marsh wren (*Cistothorus stellaris*). Collected one male in marsh behind the island April 4, 1925.

*Long-billed marsh wren (*Telmatodytes palustris palustris*). Quite common in marsh and breeder.

Blue-gray gnatcatcher (*Polioptila caerulea caerulea*). A pair of these birds were observed April 18, 1925.

Wood thrush (*Hylocichia mustelina*). Saw and collected one on May 1, 1925.

Veery (*Hylocichla fuscescens fuscescens*). Very common from April 24 to May 4, 1925.

Bluebird (*Sialia sialis sialis*). Observed a few May 1, 1925.

DUCK ABUNDANCE IN 1927-28

In marked contrast to the several preceding years was the enormous influx of wild waterfowl into Louisiana during the winter months of 1927-28. The migration of the ducks and geese was late, when compared to previous seasons, but when the ducks began to arrive in the latter part of October it was easily apparent that the sportsmen of the state were in for a banner year. Results at the Delta Duck Club, where the largest kill in its history was obtained, proved the abundance.

As in previous years, the ducks repeated the "cramming" of numbers into the southwestern section of the state, particularly into Cameron parish marshes. The general neighborhood of the mouth of the river witnessed a heavy influx of the winged visitors making the shooting excellent not only on the properties of the Delta Duck Club, but on the state club at Pass a la Loutre, the Jump, and on the Chateau Canard hunting grounds of Joseph Leiter. Abundance of species as well as numbers marked the season in the vicinity of Lake Arthur, where the Lake Arthur Club members and visitors enjoyed the best sport of years.

Non-resident hunters from various states of the Union visited our marshes during the year that has just passed into duck history and have praised the sport to be found here without stint. One enthusiast, John T. Patterson of Houston, Texas, furnished the director of this division with a most interesting resume of his out-

ings, and it reflects in a very accurate manner the abundance of the different species of ducks throughout the season.

"I made several hunts in Louisiana during the season just passed," writes Mr. Patterson, "and I believe that the department and hunters will be interested in a report of my observations as to the concentration of the ducks in the section where I shot, the Cameron parish marshes about one and a half miles north of Sweet Lake and just east of Willow Lake.

"About the middle of November there were plenty of green head mallards, a few blue-wing teal and pintails, not many spoonbills, a sprinkling of scaup and an occasional Canadian goose flying over. The percentage of ducks in order named about as follows: mallard, 65%, teal 15%, sprigs 15%, spoonbills 5%, etc. At this time it took about one and a half hours to get the 25 duck bag limit.

"First of December the large percentage was of sprigs, still a few blue-wing teal, gray duck and black mallard and about 25% green-head mallard. It took about three and one-half hours to get the 25.

"Middle of January: sprig, gray duck, black mallard, spoonbills and some green-wing teal took six hours to get 25. I attribute this to the big freeze about January first when this marsh was frozen over harder than in 16 years. Quite a bit of the vegetation was frozen and dead. Underneath the water, however, the feed seemed to be in fine shape and green. I was told that green-head mallards were in abundance up in the river bottoms 35 to 50 miles north of the marsh in Calcasieu and adjacent parishes.

"Last of January: very few green-heads, nearly all sprigs, gray duck and green-wing teal and spoonbills, few scaup and black mallards. Took seven hours to get 25, and the ducks generally seemed to be very scarce in this locality, there was plenty of feed below the water, however.

"I understand from other hunters that during Jan-



(Photo by Stanley C. Arthur)

THE PELICAN FEEDS HER YOUNG

The brown pelican is the emblematic bird of Louisiana and nests along the long Gulf Coast of this state by hundreds of thousands. It is a resident bird and does not migrate.

uary there was a great concentration of ducks below Grand Chenier in the Rockefeller Game Preserve and that they had in fact about denuded the place of feed.

"The Sweet Lake marsh, I would say, is a fine place the first part of the season this year, and after the green-head mallard had been in there a while and feeding in the rice fields adjacent their livers begin to turn a cream color, they are very fat and of fine flavor.

"There was plenty of feed in the marsh at all times, and it is my belief that shooting all over this particular marsh caused the ducks to go other places further back toward the Gulf and that now the season is over I am sure they have returned there and will find plenty of feed and the concentration will be as great as at the beginning of the season.

"It is my opinion that if the various hunting clubs would allow a concentration of ducks at a central point in their hunting grounds, they would form a body of several thousand, and would learn that this particular spot was a safe resting ground at all times and let the shooting be done at from three-fourths to a mile around this body, the shooting would be good all season as there would always be a flight of ducks coming and going to fill the bag of every hunter, who would be able to get his limit in two or three hours in the early morning when the flight is best, with no afternoon shooting, the marsh would be undisturbed more than 90 per cent of the time.

"The kind of ducks I killed was as follows: green-head mallards, and black ducks, sprigs, blue and green-wing teal, spoonbills, scaup (lesser), baldpate, grey duck. Six canvasbacks were seen flying over, no red-heads were seen."

The January freeze, as pointed out by Mr. Patterson, had a marked effect on the duck concentration in many sections and after the cold weather passed there was a scarcity of ducks. Just where the ducks went is a matter that has not been solved although the matter was given considerable attention by this division and

several members of the United States Biological Survey who visited Louisiana late in the season.

Dr. E. W. Nelson, former chief of the Biological Survey, and presently the survey's senior biologist, was in the state for a considerable stay making a study of the blue geese. During a portion of his stay he was accompanied by Frederick C. Walcott, game commissioner of the state of Connecticut. Dr. Harry C. Oberholser, of the biological survey's bird experts, was here in the interest of the duck census that has been started by the Federal Bureau. Paul G. Redington, chief of the Biological Survey, was another Federal visitor.

The Duck Kill in Louisiana

In January, 1927, the biological survey called a meeting at Washington to consider the movement that was started in the East to cut the bag limit on ducks from 25 daily, and the geese from 8 to 4 a day. It was also proposed that there should be inaugurated, under the provisions of the Migratory Bird Treaty Act, four rest days a week when no shooting of wild waterfowl should be permitted, the rest days to be Saturday, Sunday, Monday and Tuesday of each week during the legal open season.

The director of this division, together with John Dymond, Jr., president of the Delta Duck Club, attended the Washington conference which was presided over by the assistant secretary of agriculture. It is believed that the facts presented by the Department of Conservation and Mr. Dymond had a marked influence in killing off this proposed regulation.

One of the features of the phases presented by the Louisiana representatives was the kill of ducks at the Delta Duck Club and the compilation of the kill figures made possible through the enactment by the 1926 legislature of the law that made it necessary for all hunting clubs in the state to keep a record of the kill of game and to furnish the department with a copy of such records at the close of the season. All hunting

clubs must take out a \$5 license to operate and, while this regulation was not wholly pleasing to the sportsmen during the first season, it is now universally recognized by our sportsmen that this was a wise piece of legislation and the sportsmen are to a unit in favor of it.

In the following tables will be found a transcription of the kill at the various clubs for the 1927-28 season. Most of the clubs furnished the department with a daily record, by species, of each hunter. Some of the clubs furnished us merely with a record of the grand total of ducks and geese. It is expected that next year a uniform record will be kept by all of the clubs and thus make the compilation of figures much easier and more exact.

A survey of this table will show that 2,750 hunters killed:

Greenhead mallards	23,990
Northern black mallards	248
Summer mallards	403
Grey duck	4,467
Widgeon	1,080
Green-winged teal	4,180
Blue-winged teal	3,160
Spoonbills	1,191
Pintalls	17,318
Redheads	307
Canvasbacks	1,925
Scaups (dos-gris)	1,663
Blackjacks	1,366
Butterballs	18
Coots (poule d'eau)	989
Snipe	228
Woodcocks	2
Snow geese	333
Blue geese	556
White-fronted geese	193
Canada geese	114
Rails	10
Deer	46
Miscellaneous ducks	7,211
Miscellaneous geese	359

This will show that the hunters killed 68,527 ducks of various species, and 1,555 geese. This shows that

2,725 hunters at the duck clubs killed on an average only slightly in excess of 25 ducks each **for the season!** Which amply refutes the oft repeated assertion that the duck hunters of Louisiana at the various hunting clubs and elsewhere, **slaughter** the birds every day during the hunting season. When it is remembered that the daily limit allowed by state and federal laws is 25 ducks **a day** and only 25 ducks **a season** is averaged at the favored hunting clubs it can be seen that this **slaughter** is mythical.

It is not possible, in this report, to reproduce all of the details of the hunts that were made but it is believed that there is interest enough to see what the various large hunting clubs averaged. As it is the senior club and one of the best known on the North American continent a brief resume of the Delta Duck Club kill is presented first.

Delta Duck Club, 1927-28:

910 hunts made by various members.
16,494 ducks killed.
461 geese.
Average kill per hunt: 18.11% ducks.

Ducks—	1927-28	1926-27
Mallards -----	3,084	1,853
Grey ducks-----	2,562	2,150
Widgeons -----	682	757
Teals -----	197	150
Spoonbills -----	167	181
Pintails -----	6,974	5,595
Redheads -----	201	50
Canvasbacks -----	1,820	1,472
Scaup (dos-gris)-----	257	457
Blackjacks -----	550	399
	16,494	13,338
Blue geese-----	461	262

For the past six seasons the Delta Duck Club records show:

Season	No. Hunts	Ducks Killed	Average Kill Per Hunt
1922-1923----	705	13,767	19.5276
1923-1924----	655	11,080	16.916
1924-1925----	718	13,936	19.409
1925-1926----	728	8,919	12.23
1926-1927----	714	13,338	18.66
1927-1928----	910	16,494	18.11

The Coastal Hunting Club, of Lake Charles, with club grounds in Cameron Parish, reported that 506 hunts were made in the 1927-28 season, 9,336 ducks were killed, and 216 geese bagged, or an average of 18.45 per hunt. The specific duck kill was:

	1927-28
Mallard, greenhead-----	4,000
Mallard, northern-----	127
Mallard, summer-----	202
Grey duck-----	414
Widgeon -----	220
Green-winged teal-----	1,518
Blue-winged teal-----	1,305
Pintails -----	1,488
Redheads -----	18
Canvasbacks -----	34
Scaups (dos-gris)-----	7
Butterballs -----	3
	9,336
Snow geese-----	41
Blue geese-----	74
White-fronted geese-----	51
Canada geese-----	50
	216

For the 1926-27 season the Coastal Club did not keep a record of the kill of ducks and geese by species. Their report for that year showed that 685 hunts were made, 12,049 ducks were killed, and 131 geese taken. The average kill of ducks per hunt was 17.08.

The Lake Arthur Club, with headquarters at Lake



Green-winged teal in flight

Arthur and shooting grounds in northeastern section of Cameron Parish, had 90 hunts on their grounds during the 1927-28 season. The combined duck kill was 7,810 ducks and 44 geese. The specific kill was:

Mallards, greenhead-----	3,627
Mallards, northern-----	8
Grey ducks-----	538
Widgeon -----	66
Green-winged teals-----	146
Blue-winged teals-----	741
Spoonbills -----	113
Pintails -----	1,705
Redheads -----	43
Canvasbacks -----	28
Scaup (dos-gris)-----	182
Blackjacks -----	113
Butterballs -----	12
	7,810
White-fronted geese-----	13
Canada geese-----	30
	43

REPORT OF LICENSED HUNTING CLUBS

Name of Club	Number of Hunters	Greenhead Mallard	Northern Blk. Mallard	Summer Mallard	Gadwall or Gray Duck	Widgeon or Baldpate	Green-winged Teal	Blue-winged Teal	Spoonbill	Pintail	Redhead
Alligator	6	---	---	---	---	---	19	---	4	---	---
Buckhorn	6	---	---	---	---	---	---	---	---	---	---
Crowley Louisiana	158	---	---	---	---	---	---	---	---	---	---
Coastal	*506	4000	127	202	414	220	1518	1305	---	1488	18
Crescent	13	180	---	---	29	1	141	---	32	371	2
Delta	*910	3084	---	---	2562	682	197	---	167	6974	201
Digale	80	---	---	---	---	---	---	---	---	---	---
Florence	*218	2601	---	---	---	---	694	---	53	1463	---
Galva	4	---	---	---	---	---	---	---	---	---	---
Little Lake	28	705	---	23	183	41	290	766	128	1431	17
Lafitte	14	566	5	2	18	---	2	27	8	146	---
Lake Arthur	90	3627	8	---	538	66	146	741	113	1705	43
Lake Catherine	5	--69	41	---	135	65	20	17	29	143	7
Lake Charles	35	1017	57	151	31	42	141	105	62	489	8
Manning	52	297	7	---	106	---	145	---	45	153	---
Netherlands	12	761	---	---	230	12	24	130	143	691	16
Orange-Cameron	47	90	31	3	34	4	149	1	127	281	---
Pine Hills	36	269	13	---	72	8	179	69	46	410	2
Rigolets	2	7	---	---	45	---	7	---	15	---	---
Ruddock	9	---	---	---	---	---	---	---	---	---	---
Savanne Nouvelle	28	---	---	---	---	---	---	---	---	---	---
Savoie	57	284	---	---	---	---	24	---	---	186	---
Star	338	6356	---	9	24	---	225	16	17	468	---
Seven Ponds	65	30	---	13	86	4	8	---	28	103	---
Stella	19	80	---	---	13	---	271	---	200	926	---
Pine Island	17	36	---	---	82	---	---	---	3	33	---
Pass a la Loutre	195	490	---	---	786	47	44	1	77	408	14

*—Indicates number of hunts in season.

The Lake Arthur Club's records showed the kill by members and guests for the season and therefore it is impossible to obtain a percentage of the kill per hunt, but the average season bag by hunters shows that the gunners there secured an average of 86.7 ducks for the 1927-28 season, and an average of 113.01 for the 110 hunters in the 1926-27 season, when 12,351 ducks were killed and 13 geese were taken.

It is believed that should the department issue a special bulletin on the game birds of Louisiana that a full compilation of the figures of the kill from all of the hunting clubs of the state will prove to be a valuable record to keep in printed form so that some estimate as to the abundance of the game in the next decade or so can be made and thereby show to a certainty whether or not the game is on the increase or decrease.

THE PASS A LA LOUTRE CLUB

Hunting conditions at the state hunting grounds, the Pass a la Loutre club, maintained by the Department of Conservation, were not at all favorable to the sport of taking ducks during the 1926-27 season. There was an unexplainable absence of the birds and as a result the club was not as well patronized as in past seasons. A total of 2,310 ducks was bagged during 164 hunts, making the average kill 14.08 per cent.

The best shooting, as usual, proved to be during the month of November, slackening off during December, and an almost absence of game during January.

The past season, that of 1927-28, proved that when the ducks are plentiful in the southwestern section of Louisiana that the Pass a la Loutre club gets its share of the wild fowl, as the following table will show:

Pass a la Loutre Club		
	1926-27	1927-28
Mallard -----	273	490
Gadwall -----	125	786
Widgeon -----	9	47
Green-winged teal-----	106	44
Blue-winged teal-----	5	1

Pass a la Loutre Club—Continued .

Spoonbill -----	86	77
Pintail -----	105	408
Redhead -----	2	14
Canvasback -----	14	64
Scaup (dos gris)-----	54	123
Blackjack -----	1,528	541
Total ducks-----	2,310	2,595
Coots (poule d'eau)----	180	128
Bluegeese -----	---	16

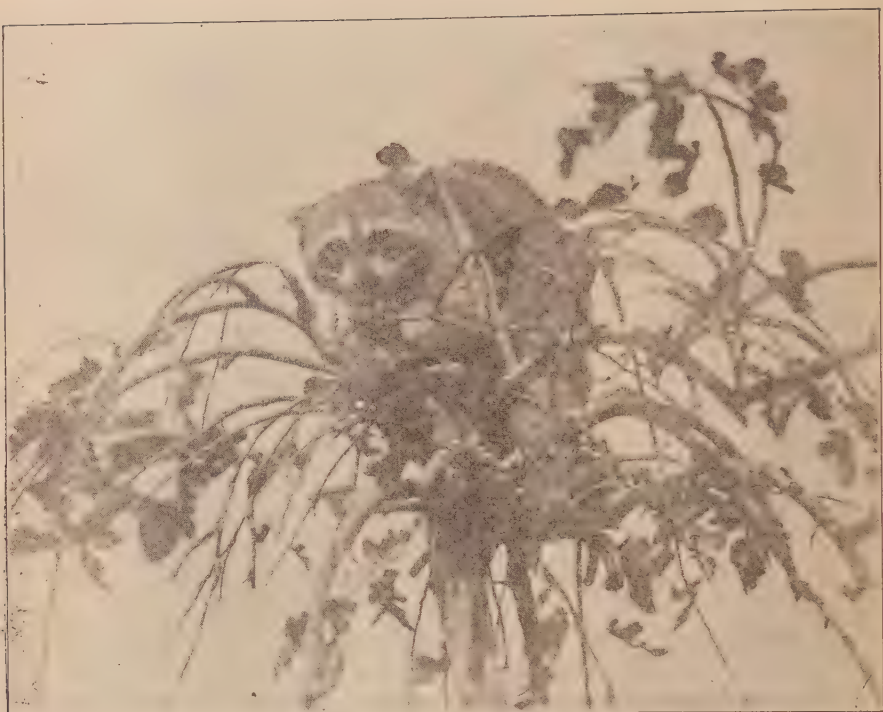
The wild duck kill during the 1927-28 season, and the increase in the species of birds visiting the ponds of the state club, where the 195 hunters made a kill of 2,595 ducks, or an average per hunt of 13.30 per cent shows that here, at the very mouth of the Mississippi River, there is not the "duck slaughter" one hears so much about up North.

A number of needed improvements have been made on the club property and the club house has been repaired and a new electric light plant installed, and a number of other improvements are planned for the coming seasons.

THE TAKE OF FUR ANIMALS

Louisiana has been through two peculiar seasons in the take of fur animals since the legislature received a report from the department on the fur industry. The 1926-27 season had a marked falling off in the take of muskrats and some of the other fur animals, due to a slow recovery from the two drought seasons of 1924 and 1925, when there was a much heavier take of these mammals than there should have been. Trappers, lured by the spectacular rise in the price of the Louisiana muskrat, invaded most of the trapping lands taking all of the animals they could and without a proper regard to the necessity for leaving a proper amount of "seed," or breeding stock.

The marked falling off of the take of animals brought home to many of the trappers and most of the owners of suitable trapping lands the necessity of conserving these animals and many of the larger areas,



The raccoon is one of our fur animals whose numbers have decreased during the past few trapping seasons

as a result of the advice given by the department of conservation officials, remained untrapped so as to allow a natural restocking by breeding. This wise action on the part of many contributed to the small take of muskrats in a number of sections, particularly in the western sections of the coastal muskrat belt and the subsequent increase of the fur animals in this section proved the reliability of the advice given by the division of wild life.

In the 1926-27 season the chief muskrat producing area was that section of Plaquemines and St. Bernard Parishes known as Delacroix Island. Here, our figures from the total catch that year indicate, approximately 2,500,000 muskrat pelts were harvested in this favored region. In the spring of 1927 due to the high water danger menacing the City of New Orleans, the levee



An opossum playing 'possum. The take of this fur bearing animal is increasing every year in spite of hard trapping

was cut at Caernarvon and the flood waters from this artificial crevasse flooded this rich fur producing area—without doubt the most valuable fur area on the North American continent. The Department of Conservation, with the invaluable aid of the owners and trappers of this area, did everything possible to save the muskrats, swept from their natural habitat by the muddy whirl of the giant Mississippi's angry flood waters. Rafts were built, the area was guarded against those who would kill the valuable fur animals out of season and during a period of the year when their pelts were of little value because they were wearing their summer pelage, and assistance was also given after the flood waters had drained off in upbuilding the area. A pen and camera picture of this unprecedented disaster will be found in the beginning of the report from this division on page 227.

As a result of the artificial crevasse this area

could not be trapped for the season 1927-28 and the fur take of muskrats, as a consequence, showed a marked falling off. Had this area remained at normal production the muskrat take for the past season would have gone back to a normal 5,000,000 muskrat production.

The preliminary report made in April, 1927, by the director of this division indicated that the coastal plains portion of the muskrat belt was slower to recover from drought conditions that prevailed in 1924 and 1925. This condition held true of conditions in the middle coastal alluvial sections of St. Mary, Terrebonne, Lafourche, and Jefferson Parishes. All of the heretofore heavy 'rat producing territories of the coastal plains region, from Marsh Island westward to the Sabine River, was very lightly trapped and many large holdings, such as the Orange-Cameron Land Company's great 163,000 acre 'rat ranch, was not trapped at all by owners who preferred to allow the muskrats to propagate and, as events proved, this was just the thing to do.

As in the 1925-26 season, the Parishes of St. Bernard and Plaquemines contributed the bulk of the muskrat take and, as mentioned above, probably 80 per cent of the muskrat pelts harvested in the 1926-27 season came off a single holding near Delacroix Island where armed trouble was experienced at the opening of the season through conflicting claims of land owners and the trappers. All of the fur animals declined in numbers taken with the exception of opossums and otters. Mink declined in numbers as did the raccoons to a decided extent.



Louisiana trappers in their pirogues

Comparative Takes.

	1924-25	1925-26	1926-27	1927-28*
Muskrat -----	6,236,165	3,613,765	3,036,749	2,858,834
Opossum -----	287,180	198,490	356,184	339,210
Raccoon -----	145,810	128,516	127,882	103,544
Mink -----	84,201	51,447	43,896	67,284
Otter -----	2,110	2,024	2,554	1,190
Skunks -----	14,752	30,866	27,671	22,348
Miscellaneous pelts-----	947	1,058	1,095	1,072
Total -----	6,791,265	4,026,166	3,596,031	3,393,482
Value -----	\$6,490,340	\$5,528,982	\$6,932,107	\$5,125,363

The above table illustrates graphically the fact that the rise in fur pelts from Louisiana in the general market, in spite of reduced takes, has brought a great deal of wealth to the trappers of the state as well as all of the valuations herewith computed are averaged on the prices the actual trapper secures for his work in the swamps, woods and marshes and not on the final



A typical pirogue trail through the marsh

market price of the fur when it reaches the marts of trade.

At the 1926 session of the legislature the fur act was reenacted and put into operation. It proved to be the best act for the conservation of the fur animals ever enacted by any state. One of the principal provisions of the new law was the raising of the fur tax on each muskrat and opossum pelt taken, from $\frac{1}{4}c$ to 1c each. Raccoon and mink pelts were set at 5c each, otter 25c each, and all other fur animals 1c each. The money thus secured was dedicated by a special section of the law to the Department of Conservation "to be devoted to the policing, conserving, replenishing and upbuilding" of the fur animals of Louisiana, and the department was further directed to conduct researches into the life habits of the fur bearers through technical-



The bulrush is one of the important muskrat foods

ly trained officers and employees and to give full publicity to such biological findings.

The license of the individual trapper was raised from \$1.25 to \$2.00 and it was made mandatory for the trapper to secure his license in the parish where he conducted his trapping operations. The license monies thus secured were dedicated to the individual parishes, to be turned over to the parish treasurer by the tax collector, and **expended in the parish in aid of fur animal conservation.** This matter is treated in another section of this report, together with a table showing the amounts secured by the several parishes and what disposition has been made of such collections.

The license tax on buyers and dealers was raised by Act 80 of 1926. Resident buyers were raised from \$5.00 to \$10.00, non-resident buyers were required to pay a \$50.00 license, resident dealers were raised from

\$25.00 to \$50.00, and non-resident dealers were required to pay a license of \$250.00

New Orleans Dealers Contest Law.

When it became necessary for the department to give the committee on reparations for the City of New Orleans, who had to settle on the amounts that the Crescent City would have to reimburse those who suffered from the cutting of the Caernarvon levee, the officers of this division endeavored to secure information from the New Orleans fur dealers by auditing their books, as called for under the State Fur Act. The dealers refused the director of this division the right to inspect and audit their books and when warrants were sworn out for their arrest, fourteen of the dealers instituted civil court proceedings to have the fur act declared unconstitutional.

The hearing took place before Judge Hugh C. Cage, of the New Orleans Civil District Court, and the trial attracted a great deal of attention both here and outside the state. The department was represented by the attorney general's office, through Peyton Sandoz, assistant attorney general, and attorneys J. Blanc Monroe, Arthur Hammond and James Schillin, representing the reparations committee, and constituted assistant attorney generals by Judge Percy Saint.

A brilliant defense was made of the department's right to examine the dealers' books, the fact that the state owned the fur animals until they had been taken and all provisions and regulations of the law lived up to, and it was conclusively shown that the dealers fighting the constitutionality of the act had assisted the Department of Conservation in concocting the very laws they were endeavoring to tear down.

In the lower court, Judge Cage reviewed all of the evidence submitted and declared that dealers had not come into a court of equity "with clean hands," and upheld the right of the department to audit their books. Not satisfied with this decision the fur dealers carried their fight to the State Supreme Court, where

they lost their appeal, and then they took the fight to the United States Supreme Court where they again lost.

The final decision was not handed down until almost at the very beginning of the 1927-28 fur trapping season and the department was thus prevented from auditing the books and arriving at a true amount of the Louisiana fur take during the previous season. A number of the dealers were forced to pay fur taxes in excess of the amounts they had declared in their reports, and the fur figures were raised from the preliminary figures estimated by the director of this division, nearly a million pelts of all kinds, as is shown by the following figures:

1926-27 Fur Take.

	Preliminary Report		Final Report	
Muskrat -----	2,137,309	\$3,740,290.75	3,036,749	\$5,314,310.75
Opossum -----	308,958	308,958.00	356,184	356,184.00
Raccoon -----	101,640	660,660.00	127,882	831,233.00
Mink -----	40,979	327,832.00	43,896	351,168.00
Otter -----	2,554	43,418.00	2,554	43,418.00
Skunk -----	21,355	25,693.00	27,671	34,588.75
Mis'c Pelts-----	631	694.10	1,095	1,204.50
	2,613,426	\$5,108,546.60	3,596,031	\$6,932,107.00

The above table shows the catch by species and the approximate value of the catch to the trappers.

Due to the legal obstacles placed in our path by the members of the Louisiana Fur Dealers' Association, whose fourteen members contributed to the court action, the final auditing of the dealers' books is still under way when this report is being written and it has been impossible to audit the books for the exact take of the 1927-28 season in time to incorporate the figures in this biennial report. An estimate of the catch, which is believed in the main to be fairly accurate, has been made for legislative guidance.

According to the as yet incomplete audit of the various books and reports from fur dealers, the De-

partment of Conservation has received the following amounts for fur tax collections for the 1926-27 season:

	Season 1926-27		
Muskrats -----	2,223,957	@ 1c	\$22,239.57
Opossums -----	323,814	@ 1c	3,238.14
Raccoons -----	116,257	@ 5c	5,812.85
Minks -----	43,896	@ 5c	2,194.80
Otters -----	1,077	@ 25c	269.25
Skunks -----	22,578	@ 1c	225.78
Civet Cats -----	5,093	@ 1c	50.93
Ringtail Cats -----	44	@ 1c	.44
Wild Cats -----	569	@ 1c	5.69
Foxes -----	396	@ 1c	3.96
Wolves -----	24	@ 1c	.24
Miscellaneous Pelts -----	62	@ 1c	.62
	2,737,767		\$34,042.27
Resident Buyers' Licenses -----	704	@ \$ 10	\$ 7,040.00
Non-Resident Buyers -----	12	@ 50	600.00
Resident Dealers -----	56	@ 50	2,800.00
Non-Resident Dealers -----	6	@ 250	1,500.00
Total -----			\$45,982.27

These monies are from dealers and from individual trappers who sent their own furs outside the state and remitted to the department direct.

Praise from New York.

In an editorial the New York Fur Trade Review, under the heading "Saving the Muskrat", paid a marked compliment to the work that our state has been doing in conserving the fur animals of Louisiana. The editorial was inspired by the report of this division in the biennial report to the legislature two years ago. The editor said:

"In this issue of FUR TRADE REVIEW we reprint extracts from one of the most interesting and helpful documents having to do with the fur trade published during the past ten years. Not since the publication of the report on the Government survey and findings on the Alaska seal herd, made in 1911, has any-

thing of equal importance been presented for the consideration and benefit of the fur industry.

"The document to which we refer is the official report of the Department of Conservation of the State of Louisiana. Within its pages is to be found a wealth of valuable facts and findings concerning the present and future supply of muskrats. That part of the report devoted to the fur resources of Louisiana is full of practical information actually gathered in the field. In a sense it constitutes a text book for those interested in the farming of these all-important fur-bearing animals.

"The principal truth, however, hammered home in this report is, that while Louisiana is the greatest muskrat and mink producing state on the North American continent, it cannot long remain so unless certain very definite and specific recommendations and laws are carried out and enforced. The old bugbear of the fur trade—overtrapping—threatens the once apparently inexhaustible supply of muskrats found swarming through the salt marshes of the Louisiana coast. Luckily for Louisiana and the fur trade, that state appears to be blessed with a far sighted and active Commissioner of Conservation, and what is more important, he has the support and encouragement of the best of the trappers, the landowners and the fur dealers. He is trying to increase the supply of Louisiana muskrats and is attempting to maintain a yearly catch, constant in numbers, that will bring profits to the owners, the trappers, and revenue to the state.

"In view of the fact that the Louisiana muskrat is literally the backbone of the annual muskrat supply from North America and has totalled anywhere from four to six or seven million pelts a year, it is not hard to understand how necessary to the welfare of the American fur industry it is that the Louisiana state officials succeed in their conservation plans. It is up to the fur trade everywhere to help them all it can. Incidentally, this report is recommended to the close attention of those who realize the truth of the old saying that one cannot have one's cake and eat it. The report will be an education to many who think they



Young mink on department's experimental fur farm

know all there is to be known about furs and fur resources."

This publication in the same and subsequent numbers printed copious excerpts from the report of this division and thereby centered not only nation-wide but world-wide attention to what Louisiana has been and is doing to conserve and upbuild this valuable resource as requests for this particular biennial report came from Soviet Russia, Turkey, Africa, New Zealand, Germany, several from France, England, Ireland, Scotland, Finland, Czecho-Slovakia and a hundred or more requests for the report were received from Canada.

Canada, long the leader in the production of fur pelts, was interested in the fact that Louisiana was such a large pelt producer and the news that Louisiana exceeded all the provinces and territories in the number of pelts produced was in the nature of a shock to those who believed that furs **must** come from the cold coun-



An ordinary tabby cat and her adopted family of baby minks

tries. Our modern laws adopted at the last session of the legislature attracted a great deal of favorable comment and attention.

Praise from Canada.

A suggestion that the provincial game wardens of Canada adopt the Louisiana methods of dealing with the fur-bearing animal situation was contained in the September, 1926, issue of the Northern Fur Trade Journal, one of the leading fur publications of the dominion published in Winnipeg, Manitoba. Louisiana's position as the leading fur producing territory in North America was not only editorially recognized by the publication but it urged the adoption of this state's fur laws by provincial game commissioners.

An extensive story of the Louisiana fur animal industry was also carried in the Manitoba journal as a result of an interview with the director of the wild life

division of the Department of Conservation when he was in the province studying northern fur conditions there as well as the migratory game bird life.

The Northern Fur Trade Journal commented on the enormous catch of muskrats in Louisiana and declared that Canadian game officials and others interested in the industry could learn much of the muskrat from Louisiana. It congratulated the department for the scientific survey that is now being made of fur animals by the conservation department, under direction of the division of wild life.

"In the season 1924-25 the Louisiana muskrat catch was 6,196,165 skins, valued at \$5,152,936," said the editorial, "for the same period Canada produced 2,515-142 muskrat skins. The entire Louisiana muskrat catch came from the coastal marshes with an area of 2,500,000 acres; compare this with the almost inestimable area of muskrat habitat in Canada.

"This comparison leads directly to the great question: What is the matter with Canadian production? The marsh area is immense. Is it deficient in food? Is the indigenous animal the wrong kind of animal—less prolific than the Southern variety. Or are we to be satisfied with the unsophisticated conclusion that our marshes are overtrapped? Ten thousand muskrat trappers do the work in Louisiana; Manitoba with a much larger area, has less than half of that number actively trapping muskrats.

"All of these lead back to the conclusion that we have a lot to learn about muskrats."

C. D. Lang, the editor, of the Northern Fur Journal, further in his editorial said: "It may be in order to quote Section 11 of the Louisiana laws and the attention of all Canadian Provincial governments is particularly called to the clause replenishing and upbuilding of the non-game quadrupeds, where it is used in distinction with the word conserving, thus embracing a positive policy of constructive increase in addition to the negative policy of conserving that which is already in existence. It should also be pointed out that this section is not merely an understood policy or a litany

adorning a report; it is written into the law. It will be a long step forward in the right direction when Canadian game laws promise some return from the revenues such laws extract from fur resources.

"The Louisiana law reads: That all money payable under the provisions of this act shall be paid the Department of Conservation and devoted to the policing, conserving, replenishing and upbuilding of the fur-bearing non-game quadrupeds of the state. The Department of Conservation shall conduct scientific researches into the life habits of the fur-bearers through technically trained officers and employees and, when practicable, give full publicity to such biological findings.

"This section of the Louisiana law," concludes editor Lang, "may contain the answer to the question regarding the relative productivity of marsh areas in Louisiana and Canada."

PARISH TRAPPING FUNDS

Under the provisions of Act 80 of 1926, the fur law, trappers of fur animals were required to secure a license at a cost of \$2.00. This license had to be secured in the parish where he would trap and the tax collector was directed to pay over the license collections, less the usual commissions deducted in payment of the tax collector's services, to the treasurer of the parish.

The monies thus secured were "to be used and expended in said parish in aid of fur animal conservation".

At the close of the 1927-28 trapping season the director of this division communicated with the various sheriffs and parish treasurers to obtain official information as to the number of licenses thus sold and to what conservation usages the monies were put. The information desired was forthcoming from a majority of the parishes but many of the parish officials, even after repeated urgings, would not answer letters from the department on this subject.

During the two years the law has been in effect the director of this division appeared before a number of

the parish police juries, explaining the purposes of the act, recommending use of the trappers' license monies, and cooperating in other ways.

From the table on pages 312-13 it will be seen that 37 of the 64 parishes reported that the trapping license fund was "held by the parish treasurer—nothing expended", thus defeating the very object of the act that granted the parish this extra fund that could be used for a very worthy purpose.

Of the remaining parishes 15 reported that special agents had been employed to see that the fur law was not violated and these special agents, who were furnished commissions by the conservation commissioner, were paid from the monies so collected.

From the list that follows it will be seen that eight of the parishes, Ascension, Assumption, Caldwell, East Baton Rouge, Iberville, St. Helena, St. John and St. Landry, did not report whether the funds collected were used for conserving the fur animals of the parish or whether they were held by the parish treasurer. Five separate communications from the department failed to receive an answer on this subject, although some of the sheriffs reported as to the number of licenses sold.

The authorities of the Parish of Beauregard reported that the license monies collected, \$520, had been used for **tree planting**—hardly a fur animal conservation move if the trees were planted along the highways, which appears to be the case.

The Parish of Calcasieu used \$12.50 of its \$1,236, for prosecuting a trapper who had violated the law and the parish treasurer still has the unexpended balance of \$1,220.19 lying idle as far as fur animal conservation is concerned. The Parish of La Salle expended \$20 of the \$173.53 collected as a bounty on wolf scalps—a very excellent use of such funds. Morehouse reports \$80 paid out for the services of a special agent with \$398.16 held by the parish treasurer, although the records indicate that \$814 was collected from the trappers of Morehouse during the two seasons. Tensas reported that out of the \$744 collected that a special agent had



Of the 2,680 ducks banded at the Bear River Marshes, Utah, and at Bison Range, Montana, 271 have been retaken, only 14 of which occurred east of the 100th meridian. Of 7,820 birds banded in the East, 1,534 have been retaken, only 7 of which were found west of the 100th meridian. (See page 254.)

been employed and that a balance of \$150 was still retained by the parish treasurer.

Grant Parish, through the action of its police jury, has decided to expend the trapping license monies in an experiment to introduce muskrats into the parish. While the Louisiana muskrat is confined to the coastal belt of marshlands and is not found in the wild state in other parts of Louisiana, it is believed that efforts should be made to introduce it in interior marshes. The director of this division will personally make the survey of the marshes in the lower end of Iatt Lake, in Grant Parish, and otherwise assist in the project.

In the list that follows the amount of monies collected during the past two trapping seasons is shown in the proper columns as well as the reported disposition of the funds.

Parish—	Licenses Sold		Disposition of Funds
	1926-27	1927-28	
Acadia	\$ 134.00	\$ 158.00	-----Held by parish treasurer, nothing expended.
Allen	388.00	434.00	-----Special Agent employed and paid from fund.
Ascension	192.00	112.00	-----
Assumpt on	440.00	262.00	-----
Avoyelles	216.00	84.00	-----Held by parish treasurer, nothing expended.
Beauregard	200.00	320.00	-----Tree Planting.
Bienville	184.54	142.50	-----Held by parish treasurer, nothing expended.
Bossier	200.00	254.00	-----Special Agents employed and paid from fund.
Caddo	190.00	182.00	-----\$150 expended for protection of fur-bearing animals.
Calcasieu	488.00	748.00	-----\$12.50 used in prosecuting a trapper; \$1,220.19 held by parish treasurer.
Caldwell	120.00	138.00	-----
Cameron	492.10	568.10	-----Held by parish treasurer, nothing expended.
Catahoula	80.00	142.00	-----Held by parish treasurer, nothing expended.
Claiborne	108.00	126.00	-----Held by parish treasurer, nothing expended.
Concordia	248.00	144.00	-----Held by parish treasurer, nothing expended.
De Soto	290.00	322.00	-----Held by parish treasurer, nothing expended.
East Baton Rouge	144.00	110.00	-----
East Carroll	308.00	434.00	-----Held by parish treasurer, nothing expended.
East Feliciana	78.00	90.00	-----Held by parish treasurer, nothing expended.
Evangeline	104.00	100.00	-----Held by parish treasurer, nothing expended.
Franklin	160.00	140.00	-----Held by parish treasurer, nothing expended.
Grant	220.00	256.00	-----Held by parish treasurer, nothing expended.
Iberia	318.00	218.00	-----Held by parish treasurer, nothing expended.
Iberville	444.00	274.00	-----
Jackson	136.00	172.00	-----Held by parish treasurer, nothing expended.
Jefferson	720.00	788.00	-----Held by parish treasurer, nothing expended.
Jefferson Davis	220.00	297.00	-----Held by parish treasurer, nothing expended.
Lafayette	36.00	12.00	-----Held by parish treasurer, nothing expended.
Lafourche	1,756.00	1,836.00	-----Held by parish treasurer, nothing expended.
La Salle	81.30	92.23	-----\$20 expended for bounty on wolf scalps; balance held by parish treasurer.
Lincoln	78.00	140.00	-----Held by parish treasurer, nothing expended.

Livingston	256.00	92.00	-----Held by parish treasurer, nothing expended.
Madison	330.00	478.00	-----Special Agent employed and paid from fund.
Morehouse	362.00	452.00	-----\$80 used to pay special agent; \$398.16 held by parish treasurer.
Natchitoches	584.00	594.00	-----Special Agents employed and paid from fund.
Orleans	732.00	330.00	-----Special Agent employed and paid from fund.
Ouachita	350.00	336.00	-----Special Agents employed and paid from fund.
Plaquemines	2,075.90	1,123.64	-----Special Agents employed and paid from fund.
Pointe Coupee	318.00	258.00	-----Held by parish treasurer, nothing expended.
Rapides	544.00	592.00	-----Held by parish treasurer, nothing expended.
Red River	136.00	178.00	-----Held by parish treasurer, nothing expended.
Richland	198.00	174.00	-----Held by parish treasurer, nothing expended.
Sabine	950.00	850.00	-----Held by parish treasurer, nothing expended.
St. Bernard	947.00	660.00	-----Special Agent employed and paid from fund.
St. Charles	554.00	340.00	-----Held by parish treasurer, nothing expended.
St. Helena	74.00	70.00	-----Held by parish treasurer, nothing expended.
St. James	204.00	148.00	-----Held by parish treasurer, nothing expended.
St. John the Baptist	50.00	88.00	-----Held by parish treasurer, nothing expended.
St. Landry	418.00	268.00	-----Special Agents employed and paid from fund.
St. Martin	328.00	90.00	-----Held by parish treasurer, nothing expended.
St. Mary	1,254.00	1,346.00	-----Held by parish treasurer, nothing expended.
St. Tammany	414.00	388.00	-----Held by parish treasurer, nothing expended.
Tangipahoa	400.00	300.00	-----Agent employed through department.
Tensas	402.00	342.00	-----Special agent employed and paid from fund; balance of \$150 held by parish treasurer.
Terrebonne	3,702.00	3,236.00	-----Held by parish treasurer, nothing expended.
Union	133.75	237.50	-----Held by parish treasurer, nothing expended.
Vermilion	648.00	642.00	-----Special agents employed and paid from fund.
Vernon	480.00	586.00	-----Special agents employed and paid from fund.
Washington	258.00	342.00	-----Special Agent employed and paid from fund.
Webster	238.00	300.00	-----Special agents employed and paid from fund.
West Baton Rouge	108.00	106.00	-----Held by parish treasurer, nothing expended.
West Carroll	114.00	146.30	-----Special agents employed and paid from fund.
West Feliciana	110.00	146.00	-----Held by parish treasurer, nothing expended.
Winn	95.00	351.74*	-----Held by parish treasurer, nothing expended.

CONSIGNMENT SHIPMENTS AND TRAPPERS' CARDS FOR SEASON 1927-1928

Parties	Muskrat	Possum	Raccoon	Mink	Skunk	Otter	Civet Cat	Wild Cat	Fox	Wolf	Alligator	Weasel	Mole	Post Card Returns
Acadia	8	135	4	---	2	---	2	2	2	---	---	---	---	2
Allen	18	898	181	19	147	---	---	---	---	---	---	---	---	20
Ascension	83	224	16	6	---	---	---	---	---	---	---	2	---	4
Assumption	60	119	60	42	---	1	---	1	---	---	---	---	---	8
Avoyelles	---	83	14	10	---	---	---	---	1	1	---	---	---	2
Beauregard	---	620	169	13	51	---	---	---	5	---	---	---	---	14
Bienville	---	950	187	49	8	---	---	---	4	---	---	---	---	2
Bossier	---	648	260	154	13	---	---	---	---	---	---	---	---	12
Caddo	---	246	43	56	10	---	---	---	---	---	---	---	---	6
Calcasieu	1208	1358	429	86	142	3	197	---	6	---	---	---	---	44
Caldwell	---	228	55	1	3	---	---	---	---	---	---	---	---	3
Cameron	22,817	89	411	170	51	17	2	---	---	---	---	---	---	47
Catahoula	---	342	130	12	4	1	---	---	1	---	---	---	---	5
Claiborne	---	351	71	26	---	1	---	---	1	---	---	---	---	2
Concordia	---	12	23	1	---	---	---	---	---	---	---	---	---	---
DeSoto	---	1736	332	90	59	---	---	---	---	---	---	---	---	20
East Baton Rouge	---	162	92	16	4	---	2	---	---	---	---	---	---	5
East Carroll	---	79	50	20	4	---	3	4	---	---	---	---	---	5
East Feliciana	2	783	121	56	33	---	6	1	1	---	---	3	---	17
Evangeline	---	304	59	7	23	---	---	---	1	---	---	---	---	5
Franklin	---	126	32	4	10	---	---	---	---	---	---	---	---	3
Grant	---	1015	158	39	32	---	1	7	7	---	---	---	---	22
Iberia	136	83	59	19	15	---	---	---	---	---	---	---	---	5
Iberville	73	92	2	1	---	---	---	2	---	---	---	---	---	4
Jackson	346	777	225	65	6	---	---	---	8	---	---	---	---	16
Jefferson	206	53	120	171	---	---	---	---	---	---	---	---	---	11
Jefferson Davis	44	117	56	1	16	---	50	---	---	---	---	---	---	5
Lafayette	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lafourche	44	187	74	97	---	3	---	---	---	---	---	---	---	22
LaSalle	---	715	90	31	37	---	---	---	1	---	---	---	---	5

LICENSED TRAPPERS IN LOUISIANA

	1924-25	1925-26	1926-27	1927-28
Acadia -----	163	136	67	76
Allen -----	359	283	194	217
Ascension -----	95	104	96	56
Assumption -----	230	275	204	131
Avoyelles -----	194	340	108	42
Beauregard -----	267	196	100	160
Bienville -----	162	117	95	130
Bossier -----	173	131	100	127
Caddo -----	203	134	96	91
Calcasieu -----	611	479	267	374
Caldwell -----	225	74	60	64
Cameron -----	679	306	274	385
Catahoula -----	176	97	97	71
Claiborne -----	79	41	54	63
Concordia -----	186	169	124	72
DeSoto -----	201	162	145	161
East Baton Rouge -----	110	88	72	55
East Carroll -----	196	122	154	217
East Feliciana -----	67	36	39	45
Evangeline -----	143	123	52	50
Franklin -----	190	127	80	70
Grant -----	170	145	110	128
Iberia -----	129	141	159	109
Iberville -----	239	290	222	237
Jackson -----	155	109	68	86
Jefferson -----	507	651	360	394
Jefferson Davis -----	246	196	121	148
Lafayette -----	57	75	18	6
Lafourche -----	1495	1362	878	918
LaSalle -----	105	51	42	46
Lincoln -----	61	46	36	70
Livingston -----	192	177	94	46
Madison -----	243	236	165	239
Morehouse -----	189	219	181	226
Natchitoches -----	492	393	292	297
Orleans -----	494	442	525	165
Ouachita -----	276	137	175	168
Plaquemines -----	852	881	1055	584
Pointe Coupee -----	170	215	159	129
Rapides -----	383	415	272	296
Red River -----	165	74	68	87
Richland -----	248	169	99	87
Sabine -----	394	334	216	425
St. Bernard -----	299	301	460	330
St. Charles -----	234	241	234	170

LICENSED TRAPPERS IN LOUISIANA

	1924-25	1925-26	1926-27	1927-28
St. Helena -----	84	47	37	35
St. James -----	82	77	102	74
St. John the Baptist-----	49	69	66	44
St. Landry -----	297	265	209	84
St. Martin -----	216	125	164	45
St. Mary -----	1340	1311	565	673
St. Tammany -----	301	288	207	194
Tangipahoa -----	226	194	141	150
Tensas -----	71	166	201	171
Terrebonne -----	2492	2250	1851	1618
Union -----	151	---	70	125
Vermilion -----	1043	623	324	321
Vernon -----	206	184	157	293
Washington -----	159	172	129	171
Webster -----	220	158	122	150
West Baton Rouge-----	45	44	54	53
West Carroll -----	253	244	61	77
West Feliciana -----	107	81	55	73
Winn -----	303	207	135	227
	20,149	17,344	12,973	12,628
	\$25,186.25	\$21,680.00	\$25,946.00	\$25,256.00

THE 1927-28 FUR TAKE

Due primarily to the losses sustained in the Delacroix Island section of St. Bernard and Terrebonne parishes by the crevasse that denuded those marshes of their muskrat population, the furtake for the 1927-28 season did not reach the numbers expected. The total take of approximately three and a quarter million pelts failed to show an increase over the preceding year and it did not reach the proportions of the 1925-26 trapping season, by nearly three-quarters of a million pelts.

Had the normal take of muskrats from the Delacroix Island territory been harvested the season would have almost approximated the totals of the 1924-25 season, as it seemed certain, before the artificial crevasse was created, that the parishes of St. Bernard and Plaquemines would have produced two and a half million 'rat pelts.

At the time this report is being written full returns

from all of the dealers and other handlers of fur in Louisiana have not been received and the total take for the state can only be approximated. Figures from all sources would indicate that the past season's fur crop will be.

*1927-28 season	Pelts		Value to trapper
Muskrat -----	2,858,834	@ 1.25--	\$ 3,573,542.50
Opossum -----	339,210	@ 1.00--	339,210.00
Raccoon -----	103,544	@ 6.00--	621,264.00
Mink -----	67,284	@ 8.00--	538,272.00
Otter -----	1,190	@ 20.00--	23,800.00
Skunks -----	22,348	@ 1.25--	27,935.00
Misc. pelts-----	1,072	@ 1.25--	1,340.00
	3,393,482		\$ 5,125,363.50

*Preliminary figures based on incomplete returns.

It will be noted, by comparing these preliminary figures with the comparative takes of fur for the three preceding seasons listed on page 333, that the value of Louisiana's fur crop fell off this past year considerably. This was due to a marked decline in the price of muskrat pelts, the shrinkage in the take of raccoons in the state in spite of a higher valuation per pelt, and a falling off in the catch of otters.

When we are able to finish our audit of the books of the various fur dealers it is quite certain that many of the figures given in this preliminary report on the 1927-28 figures, will be increased.

The shrinkage of the fur crop in Louisiana since the 1924-25 season can be traced directly to the drought conditions that prevailed during the summers of 1924 and 1925. While we have had normal rainfall in the summers that have intervened, the effects of severe trapping during the dry periods are still very apparent and the need of stricter supervision of all trapping lands to see that trapping crews do not "skin off" the land is now being recognized by everyone in the trapping business, and there is a healthier regard for our trapping laws than we have had in the past.

Changing the Trapping Season.

At the 1926 session of the legislature the director of this division endeavored to have our trapping laws amended so that a 60-day season would be enacted for two seasons. An open season starting December 1 and closing January 31, was recommended. The members of the fish, game and oyster committee in the house, while recognizing the need of some curtailment in the season, changed the then existing 90-day season to one of 75 days, opening the season November 20 and closing it February 5.

This was a mistake. If a 75-day season was necessary it would have been better for the fur animals, especially the muskrats, and the prices the trappers received for their pelts, that the season had opened December 1 and remained open until February 15. Therefore, it is now earnestly recommended that the 1928 session amend the open season for trapping to December 1 to February 15, for it is believed that this is necessary for the good and the perpetuation of the fur industry of Louisiana.

Research Work on Fur Animals.

It is a matter of deep regret that the director of this division has not been able to have printed and ready for distribution a bulletin on "The Fur Animals of Louisiana", which he has been working on for the past four years. The manuscript has been finished, save for a few details on the life history of the muskrat, our principal fur producer. It is expected the printed book will be ready for distribution during the latter part of July.

The scope of this bulletin is believed to be complete and it is expected that it will prove of value to trappers, land owners, and others interested in Louisiana's very valuable fur animal resource. Since the department published its biennial report for the 1926 session of the legislature, our office has been deluged with requests for this publication by those interested in fur and muskrat raising throughout the North American continent



Modern fur drying house erected by the Mt. Forest Fur Farm on their Plaquemines Parish 'rat ranch

and abroad as well, as the report carried the results of our preliminary investigation into the life history of the muskrat in Louisiana. The field biologist employed to carry on certain phases of the necessary investigative work made some headway but during the summer of 1927 it became necessary to dispense with his services and the burden of completing the task fell upon this division's director.

'Rat Ranching in Louisiana.

As a result of the information carried in the 1926 biennial report, considerable interest in this state's fur animal fauna was created away from here and a number of influential and progressive concerns from outside the state have since invested in Louisiana marshlands to carry on the business of 'rat ranching. The Mt. Forest Fur Farm, of Detroit, Mich., was the first to investigate

Louisiana possibilities and the general manager of this foremost fur farm, M. S. Bangs, visited Louisiana and purchased two large tracts of muskrat land, one of 9,500 acres in Vermilion parish, and another of 54,000 acres in Plaquemines parish on the west bank of the Mississippi River. This concern has gone into the 'rat ranching business on a large and thoroughly modern scale. It has not attempted to take any animals off its holdings, preferring to let the land "come back" naturally and at the lowest expense. This division has co-operated with the Mt. Forest officials in every way possible by giving advice on operations, forms of buildings, biological research, and identification of food grasses. This concern plans adding to its already large Louisiana muskrat land holdings and the expressed intention of the officials is to center the muskrat industry, as far as numbers are concerned, in this state.

Flood Damage to Delacroix Island.

During the flood period of 1927, the director of this division was called upon by the reparations committee of the City of New Orleans to make a survey of the areas in Plaquemines and St. Bernard parishes inundated by the Caernarvon artificial crevasse and decide whether damage was done the trapping industry of this particular section. The matter proved to be a very delicate one, calling for a great deal of careful and personal research. Accurate data was secured on the ground, the revival of the food grasses watched, the disappearance of the muskrats and other fur animals noted, and figures, in the form of sworn affidavits, were secured from the trappers of that region. In the early fall sufficient information was secured to justify the director of this division to report to the commissioner of conservation that the fur industry in a certain specified area of the two parishes had been damaged 100 per cent for the 1927-28 trapping season.

As the area had produced in excess of 2,000,000 muskrats the winter before the inundation, and muskrats were valued in excess of \$1.50 a pelt, it can be easily surmised that the task was not an easy one for

the person designated to make the decision that called for such a great amount of damages to be paid by the City of New Orleans. The matter was finally adjusted and the trappers and land owners most affected were awarded, and accepted, damages to the amount of \$1,500,000.

When the 1927-28 trapping season was at hand this division recommended to the conservation commissioner that he declare an emergency close season on the entire area flooded by the Caernarvon crevasse waters. A meeting of those most concerned was held by the commissioner but an overwhelming majority of trappers attending voiced their opposition to the very necessary conservation move, declaring they would trap any muskrats that might have returned to the marshes if they, the trappers, were not granted reparations. As this meeting was called before the settlement of the flood claims, and as the department of conservation had nothing to do with reparations, or the actions of that committee, the commissioner wisely refused to order the emergency close season on the grounds he must have the moral and active support of those most interested—the trappers of that region,—if the close season could prove effective.

Rehabilitation Research.

In the spring of 1928, upon the request of the president and vice-president of the Acme Fur and Land Company, whose lands are acknowledged to be the most fertile fur producing marshes in this country, and who were the principal sufferers from the effect of the blasting of the Caernarvon levee, this division agreed to cooperate with this company in establishing a combined fur experimental farm and research area on the famed Delacroix Island marshlands. This work has already been started. Under the terms of the agreement with the commissioner of conservation. William A. Walsingham and Manuel Molero, the president and vice-president of the Acme Land and Fur Company, are to finance the work and the department furnish the ex-

perience, technical knowledge and scientific research, through the wild life division.

The first act was to issue permits to experienced trappers to take live muskrats in the outlying marshlands not affected by the flood waters and transport them back to the center of the area that had been covered by a sheet of flood waters. Under the able direction of the Acme company's general field manager, John C. Durham, a large corps of trappers, provided with Gibbs' live traps, took between two and three thousand live and unhurt muskrats and successfully planted them on the interior marshes. This was probably one of the most important conservation movements ever attempted for the upbuilding of the fur animals in the United States.

Fencing, of the latest and most improved kind, has been ordered and by the end of May it is expected that the experimental muskrat plots will be in full swing. There will be three major units in the initial experiments; a one-acre tract, a quarter-acre tract, and a one-tenth of an acre tract, fenced with 16 gauge one inch mesh wire. These fenced plots will, it is expected, give accurate data as to how many muskrats to an acre can be reared in natural conditions, as the plots will be placed in the natural marsh and no efforts will be made to feed the 'rats outside of the natural foods the Louisiana marsh provides. In this way we will learn just how many 'rats per acre can be counted on through 'rat ranching.

Individual pens will be built so that the life history of the muskrat can be studied, and the productive habits of mink and raccoon, and other fur animals, as well. The research work that will be carried on in this particular section is believed by the director of this division to be of the utmost importance as this land has shown itself to be the most productive, acre for acre, of any marshland in Louisiana and, for the amount of muskrats that it has produced, year in and year out, in flood year or in drought periods, it has proved a veritable gold mine for the large numbers of trappers living in that region, many of whom now own their own acreage

or are acquiring it through the fruits of their trapping operations every winter.

From the sworn affidavits of the trappers, whose trapping activities were stopped by the Caernarvon crevasse, it was ascertained that the St. Bernard marshes of the Delacroix Island section averaged 31.11 muskrats to the acre during the 1926-27 season, and the Plaquemines marshes of the same section averaged exactly 35 muskrats to the acre. One trapping area in St. Bernard parish of 128 acres, according to an affidavit, yielded 9,440 muskrats, or a take of 73.82 muskrats to the acre. One tract of 80 acres yielded a Plaquemines parish trapper, according to this affidavit, 6,000 muskrats or an average of 75 to the acre.

The two examples mentioned above are the high scores from the two parishes in that section and must not be considered as the yield on all acreage in that territory. An analysis of the figures found on the sworn affidavits indicated that the St. Bernard marshes of the Delacroix Island territory showed 481,053 muskrats being taken off of 15,462 acres, while the Plaquemines parish marshes, reporting on 20,174 acres, showed a total take of 713,939 muskrats.

From past personal knowledge, and from the figures presented by the individual trappers in their affidavits, the director of this division has no hesitancy in stating that there is no area in the State of Louisiana, or anywhere else on the North American continent, that can compare with the Delacroix Island section as a fur producer, whether the fur be that of a muskrat or a more-valuable-per-pelt fur animal. Previous floods have not been able to wipe it out and it can be confidently asserted that within two years, if the area is properly guarded, that it will be back to the same producing strength it exhibited in 1926-27, four years after a crevasse had covered its marshes with a yellowed Mississippi river flood.

Financial Statement

FINANCIAL STATEMENT OF CONSERVATION—SPECIAL ACCOUNT

RECEIPTS	
January 1, 1926, to January 1, 1927	
Severance Tax Shrimp.....	\$ 13,648.26
Interest on Daily Balances.....	431.31
Scientific Collection Certificate.....	9.00
Fishing and Freighting Vessels.....	2,587.50
Bedding Ground Rents.....	12,464.00
Sand, Gravel and Shells.....	35,653.85
Privilege Tax.....	19,448.10
Salt Water Fish and Shrimp License.....	12,397.50
Fresh Water Fish and Seine License.....	11,435.12
Dredge and Scraper License.....	7,700.00
Resale and Shipping License.....	8,723.00
Fish Dealers' License.....	1,484.90
Fur and Hide.....	13,896.81
Hunting License.....	106,404.51
Commissions Refunded.....	318.04
Transfer of Leases.....	27.00
Game Breeders' License.....	30.00
Diamond Back Terrapin License.....	275.00
Cold Drink Concession Beechwood Hatchery.....	3.00
Shop License.....	100.00
Buying, Shipping and Selling Frogs.....	255.00
Hunting Club Permits.....	215.00

\$247,517.90

DISBURSEMENTS	
January 1, 1926, to January 1, 1927	
Withdrawals State Appropriation.....	\$203,500.00
Refunds to Sheriff.....	265.05
Transfer to General Fund.....	106,686.83

\$310,451.88

RECEIPTS	
January 1, 1927, to January 1, 1928	
Severance Tax Shrimp.....	\$ 13,458.44
Interest on Daily Balances.....	241.92
Fishing and Freighting Vessels.....	1,868.50
Bedding Ground Rents.....	24,132.55
Sand, Gravel and Shells.....	43,687.05
Privilege Tax.....	22,169.12
Salt Water Fish and Shrimp License.....	14,870.00
Fresh Water Fish and Seine License.....	10,735.10
Dredge and Scraper License.....	1,520.00
Resale and Shipping License.....	5,581.50
Fish Dealers' License.....	1,940.00
Hunting License.....	102,508.27
Commissions Refunded.....	395.21
Transfer of Leases.....	17.00
Game Breeders' License.....	80.00
Diamond Back Terrapin License.....	325.00
Steam Box License.....	300.00
Shop License.....	30.00
Buying, Selling and Shipping Frogs License.....	2,630.00
Hunting Club Permits.....	260.00
Fines Collected.....	5.00
Refund a/c overpayment to Fur and Hide Division.....	1,256.10
Fresh Water Shipping License.....	6,745.00
Refund Fish, Game and Oyster Division over-Draft.....	86.78

\$254,842.54

DISBURSEMENTS	
January 1, 1927, to January 1, 1928	
Withdrawals State Appropriation.....	\$217,159.75
Fresh Water Fish and Seine License Returned.....	8.00
Tax transferred to Fur and Hide Division.....	1,409.82

\$218,577.57

SUMMARY

January 1, 1926:		
Balance in hands of State Treasurer.....		\$ 74,857.19
January 1, 1926, to January 1, 1927, Revenues.....		247,517.90
		\$322,375.09
January 1, 1926, to January 1, 1927, Disbursements.....		310,451.88
Balance		
		11,923.21
January 1, 1927, to January 1, 1928, Revenues		254,842.54
		\$266,765.75
January 1, 1927, to January 1, 1928, Disbursements.....		218,577.57
January 1, 1928, Balance in hands of State Treasurer		\$ 48,188.18

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—REGULAR ACCOUNT

RECEIPTS

January 1, 1926, to January 1, 1927

Interest on Daily Balances.....	\$ 467.11
Contingent Funds Returned.....	6,306.82
Insurance a/c Loss and Damage of Equipment.....	1,000.00
Miscellaneous Refunds.....	1.30
Sale of Confiscated Furs.....	1,318.35
Salary Adjustments.....	4,532.38
State Appropriation.....	228,000.00
Sale of Old Equipment.....	2,348.00
Sale of Launch "Hawk".....	25.00
Freight Refunded.....	11.64
Expense Refunded.....	6.67
Forestry Division Account.....	4,887.07
Pro-rata Office Expense and Supplies.....	2,951.17
Minerals Division.....	3,830.85
Loan Board of Liquidation.....	50,000.00
Refund Agents' Expense and Supplies.....	25.00
Refund Office Expense and Supplies.....	447.91
Overage in Petty Cash.....	24.13
Suspense Account.....	13.00
Deposit of Petty Cash Account.....	250.00
Fur and Hide Division Refund.....	7,175.76
Wild Life Refuge Account.....	897.75
Public Shooting Grounds Refund.....	2,000.00
Purchase of Launch "Dixie Flyer".....	5,000.00
N. S. F. Checks, Paid.....	23.66
	<u>\$321,548.57</u>

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Contingent Funds.....	\$ 5,318.94
Postage.....	1,310.51
Forestry Division.....	2,596.56
Minerals Division.....	937.45
Public Shooting Grounds.....	4,284.99
Wild Life Refuge Account.....	1,475.89
N. S. F. Checks.....	115.73

RECEIPTS

January 1, 1927, to January 1, 1928

Interest on Daily Balances.....	\$ 221.23
Contingent Funds Returned.....	1,776.63
Insurance a/c Loss and Damage of Equipment.....	342.50
Salary Adjustments.....	1,545.44
State Appropriation.....	217,159.75
Sale of Old Equipment.....	1,390.00
Forestry Division.....	1,834.42
Pro-rata Office Expense and Supplies.....	14,047.00
Minerals Division.....	25,671.34
Fur and Hide Division Refund.....	18,319.34
Wild Life Refuge Account.....	234.04
N. S. F. Checks, Paid.....	25.00
Angling License Fund.....	6,544.96
Sale of Confiscated Goods.....	553.41

DISBURSEMENTS

January 1, 1927 to January 1, 1928

Contingent Funds.....	\$ 3,654.00
Postage.....	1,131.34
Forestry Division.....	3,190.95
Minerals Division.....	1,918.90
Public Shooting Grounds.....	6,085.66
Wild Life Refuge Account.....	692.54
N. S. F. Checks.....	92.81

\$288,365.66

Bond Premiums Refunded.....	8.00
Commissioner's Salary.....	5,000.00
Commissioner's Expense.....	2,594.35
Office Salaries.....	3,562.50
Office Expense.....	6,739.99
Wild Life Division Salaries.....	7,975.00
Wild Life Division Expense.....	8,680.67
Enforcement Division Salaries.....	108,471.82
Enforcement Division Expense.....	52,304.53
Salt Water Fisheries Division Salaries.....	11,014.11
Salt Water Fisheries Division Expense.....	4,248.79
Accounting Division Salaries.....	27,476.56
Accounting Division Expense.....	1,379.79
Division of Inland Fisheries Salaries.....	10,975.00
Division of Inland Fisheries Expense.....	7,567.30
Confiscated Furs.....	163.35
Purchase of Boats.....	15,800.00
Experimental Work.....	69.27
Fur and Hide Account.....	1.73
J. C. Wilson.....	5.00
Purchase of Autos.....	5,778.89
Petty Cash Account.....	250.00
Correction of Error.....	43.26
Suspense Account.....	77.00
State Appropriation.....	24,500.00
Commissioner's Auto Expense.....	689.86
Bureau of Education Salaries.....	2,436.45
Bureau of Education Expense.....	1,390.15
Purchase of Engine.....	1,973.00
	\$327,216.14

Commissioner's Salary.....	4,999.92
Commissioner's Expense.....	1,173.78
Office Salaries.....	3,427.50
Office Expense.....	4,474.38
Wild Life Division Expense.....	955.94
Enforcement Division Salaries.....	96,986.73
Enforcement Division Expense.....	49,322.86
Salt Water Fisheries Division Salaries.....	12,047.53
Salt Water Fisheries Division Expense.....	5,396.58
Accounting Division Salaries.....	17,644.08
Accounting Division Expense.....	1,248.57
Division of Inland Fisheries Salaries.....	9,165.33
Division of Inland Fisheries Expense.....	4,231.83
Purchase of Boats.....	14,435.00
Fur and Hide Account.....	21,524.90
Suspense Account.....	11.00
Commissioner's Auto Expense.....	989.97
Bureau of Education Salaries.....	3,822.04
Bureau of Education Expense.....	2,201.37
Flood Relief Expense.....	1,311.87
Legal Expense.....	2,957.64
Reparations Committee Expense.....	1,577.33
Bayou De Siard Survey.....	115.00
Beechwood Hatchery Land Purchase.....	225.00
Refund State Treasurer.....	86.78
	\$277,097.13

SUMMARY

Bank Balance January 1, 1926.....	\$ 8,612.73
Receipts: January 1, 1926, to January 1, 1927.....	93,548.57
State Appropriation.....	228,000.00
Total Receipts.....	\$330,161.30
Less: Disbursements January 1, 1926, to January 1, 1927.....	327,216.14
Bank Balance January 1, 1927.....	\$ 2,945.16
Receipts: January 1, 1927, to January 1, 1928.....	71,205.91
State Appropriation.....	217,159.75
Total Receipts.....	\$291,310.82
Less: Disbursements January 1, 1927, to January 1, 1928.....	277,097.13
Bank Balance January 1, 1928.....	\$ 14,213.69

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—ANGLING LICENSES

RECEIPTS		RECEIPTS	
January 1, 1926, to January 1, 1927		January 1, 1927, to January 1, 1928	
Receipts from Sheriffs.....	\$ 431.30	Receipts from Sheriffs.....	\$ 7,325.61
		Interest on Daily Balances.....	34.11
		Fish, Game and Oyster Division on account.....	88.15
	<u>\$ 431.30</u>		<u>\$ 7,447.87</u>
DISBURSEMENTS		DISBURSEMENTS	
January 1, 1926, to January 1, 1927		January 1, 1927, to January 1, 1928	
NONE		Paid Fish, Game and Oyster Division.....	\$ 6,619.66
		Reparations Committee.....	38.15
			<u>\$ 6,657.81</u>

SUMMARY

January 1, 1926, Bank Balance.....	431.30
January 1, 1926, to January 1, 1927, Revenues.....	
January 1, 1926, to January 1, 1927, Disbursements.....	431.30
Balance.....	431.30
January 1, 1927, to January 1, 1928, Revenues.....	7,447.87
January 1, 1927, to January 1, 1928, Disbursements.....	7,879.17
January 1, 1928, Balance.....	6,657.81
	<u>\$ 1,221.36</u>

FINANCIAL STATEMENT
DEPARTMENT OF CONSERVATION
FUR AND HIDE DIVISION

RECEIPTS

January 1, 1926, to January 1, 1927

Sale of Confiscated Furs.....	\$ 989.80
Fur Deposits.....	1,250.00
Suspense Account.....	5.00
Resident Fur Dealers.....	2,847.45
Non-Resident Fur Dealers.....	1,367.32
Resident Fur Buyers.....	7,260.00
Non-Resident Fur Buyers.....	250.00

\$ 13,969.57

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Contingent Funds Returned.....	\$ 225.00
Suspense Account.....	5.00
Expense and Supplies.....	2,059.10
Salaries.....	8,883.87

\$ 11,172.97

RECEIPTS

January 1, 1927, to January 1, 1928

Sale of Confiscated Furs.....	\$ 184.20
Fur Deposits.....	1,500.00
Suspense Account.....	99.85
Resident Fur Dealers.....	31,005.14
Non-Resident Fur Dealers.....	4,382.20
Resident Fur Buyers.....	7,160.10
Non-Resident Fur Buyers.....	210.00
Refund Salaries.....	962.50
Interest on Daily Balances.....	510.38
Contingent Funds Returned.....	572.62

\$ 46,586.99

DISBURSEMENTS

January 1, 1927, to January 1, 1928

Contingent Funds.....	\$ 675.00
Expense and Supplies.....	2,453.75
Salaries.....	9,176.25
License Transfer—Resident Fur.....	1,266.10
Auto Repairs.....	694.93
Payment Fish, Game and Oyster Division on a/c.....	17,400.84
Postage.....	30.00
Steinberg & Company.....	1,728.86
Deposits paid to Fur Account.....	1,000.00

\$ 34,419.73

SUMMARY

January 1, 1926, Bank Balance.....	13,969.57
January 1, 1926, to January 1, 1927, Revenues.....	13,969.57
	<u>11,172.97</u>
January 1, 1926, to January 1, 1927, Disbursements.....	2,796.60
Balance	<u>46,586.99</u>
January 1, 1927, to January 1, 1928, Revenues.....	49,383.59
	<u>34,419.73</u>
January 1, 1927, to January 1, 1928, Disbursements.....	
January 1, 1928, Balance	<u>\$ 14,963.86</u>

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—FUR ACCOUNT

RECEIPTS

January 1, 1926, to January 1, 1927
Interest on Daily Balances.....\$ 181.52
Fur Deposits.....3,700.00

\$ 3,881.52

DISBURSEMENTS

January 1, 1926, to January 1, 1927
Refund Balance due Fur Deposits.....\$ 9,433.54
Fur tax transferred to Conservation Fund.....1,966.10
Fur Dealers' Licenses.....200.00

\$ 10,899.64

RECEIPTS

January 1, 1927, to January 1, 1928
Interest on Daily Balances.....\$ 60.59
Fur Deposits.....4,274.33

\$ 4,334.92

DISBURSEMENTS

January 1, 1927, to January 1, 1928
Refund Balance due Fur Deposits.....\$ 2,291.96
Refund Fur and Hide Division.....3,967.15

\$ 6,259.11

SUMMARY

January 1, 1926, Bank Balance.....	\$ 11,695.30
January 1, 1926, to January 1, 1927, Revenues.....	3,881.52
January 1, 1926, to January 1, 1927, Disbursements.....	15,576.82
Balance.....	10,899.64
January 1, 1927, to January 1, 1928, Revenues.....	4,677.18
January 1, 1927, to January 1, 1928, Disbursements.....	4,334.92
January 1, 1927, to January 1, 1928, Disbursements.....	9,012.10
January 1, 1928, Balance.....	6,259.11
	\$ 2,752.99

FINANCIAL STATEMENT
DEPARTMENT OF CONSERVATION
PUBLIC SHOOTING GROUNDS

RECEIPTS

January 1, 1926, to January 1, 1927	
Interest on Daily Balances.....	\$ 8.10
Remittances by Club Manager.....	852.29
Club Deposits.....	20.00
Advance by Fish, Game and Oyster Division	
Refund of Salaries.....	1,800.00
Returned Contingent Fund.....	61.28
Trapping Privilege.....	50.00
Refund Petty Cash.....	3,500.00
Sale of Willows.....	200.00
	97.00
	<u>\$ 6,588.67</u>

DISBURSEMENTS

January 1, 1926, to January 1, 1927	
Expenses and Supplies.....	\$ 2,072.83
Salaries.....	2,344.56
Launch Repairs.....	37.40
Fish, Game and Oyster Division Refund.....	2,000.00
	<u>\$ 6,454.79</u>

RECEIPTS

January 1, 1927, to January 1, 1928	
Interest on Daily Balances.....	\$ 10.39
Remittances by Club manager.....	1,487.58
Refund of Salaries.....	100.00
Trapping Privilege.....	500.00
Refund on Supplies.....	27.00

DISBURSEMENTS

January 1, 1927, to January 1, 1928	
Expenses and Supplies.....	\$ 588.65
Salaries.....	352.52
	<u>\$ 941.17</u>

SUMMARY

January 1, 1926, Bank Balance.....		Overdraft \$ 3.34
January 1, 1926, to January 1, 1927, Revenues.....		6,588.67
		<u>6,585.33</u>
January 1, 1926, to January 1, 1927, Disbursements.....		6,454.79
Balance.....		130.54
January 1, 1927, to January 1, 1928, Revenues.....		2,124.97
		<u>2,255.51</u>
January 1, 1927, to January 1, 1928, Disbursements.....		941.17
January 1, 1928, Balance.....		<u>\$ 1,314.34</u>

FINANCIAL STATEMENT DEPARTMENT OF CONSERVATION—FORESTRY DIVISION

RECEIPTS

January 1, 1926, to January 1, 1927

Salaries Adjusted.....	\$ 1,799.38
Collection 3/c Ford Car Purchase.....	125.00
Contingent Funds Returned.....	2,225.23
Federal Appropriation.....	19,214.67
State Appropriation.....	70,000.00
Fire Prevention Expense.....	15,823.74
sale of Seeds.....	29.59
sh, Game and Oyster Division, "Loan".....	500.00
Freight Refund.....	2.28
Interest on Daily Balances.....	86.56
State Forest Fund, Refund.....	485.94
State Forest Fund, "Loan".....	3,500.00
	\$113,792.41

RECEIPTS

January 1, 1927, to January 1, 1928

Salaries Adjusted.....	\$ 522.17
Contingent Funds Returned.....	2,473.00
Federal Appropriation.....	28,816.29
State Appropriation.....	86,666.62
Fire Prevention Expense.....	35,087.85
sale of Seeds.....	1,966.95
Interest on Daily Balances.....	283.30
State Forest Fund, "Loan".....	3,000.00

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Contingent Funds.....	\$ 2,825.00
Fire Prevention Expense.....	4,180.70
Superintendent and Office Salaries.....	14,942.06
Office Expense.....	3,129.69
Agents' Salaries.....	41,742.81
Agents' Auto Allowance.....	7,851.90
Agents' Expense.....	18,859.02
Postage.....	460.00
Fish, Game and Oyster Division.....	1,569.10
Addition to State Forest.....	221.58
Auto Purchase.....	822.00
State Appropriation.....	5,000.00
State Forest Fund.....	583.55
State Forest Nursery.....	477.08

\$102,717.19

DISBURSEMENTS

January 1, 1927, to January 1, 1928

Contingent Funds.....	\$ 3,466.00
Fire Prevention Expense.....	56,348.45
Superintendent and Office Salaries.....	18,885.70
Office Expense.....	3,705.37
Agents' Salaries.....	35,170.21
Agents' Auto Allowance.....	14,517.17
Agents' Expense.....	26,109.60
Postage.....	930.00
Fish, Game and Oyster Division.....	10.15
Auto Purchase.....	646.72
State Forest Fund.....	3,500.00
Seed Purchased.....	62.00
Land Purchased.....	11,794.62
Boys' Reforestation Club.....	200.00
Petty Cash Fund.....	300.00

\$175,645.99

SUMMARY

Bank Balance, January 1, 1926.....	\$ 2,543.72
Receipts, January 1, 1926, to January 1, 1927.....	24,577.74
Federal Appropriation.....	19,214.67
State Appropriation.....	70,000.00
Total Receipts.....	116,336.13
Less: Disbursements, January 1, 1926, to January 1, 1927.....	102,717.19
Bank Balance, January 1, 1927.....	13,618.94
Receipts, January 1, 1927, to January 1, 1928.....	43,288.17
Federal Appropriation.....	28,816.29
State Appropriation.....	86,666.72
Total Receipts.....	172,390.12
Less: Disbursements, January 1, 1927, to January 1, 1928.....	175,645.99
Bank Balance, January 1, 1928, Over-Draft.....	\$ 3,255.87

FINANCIAL STATEMENT STATE FOREST FUND

RECEIPTS

January 1, 1926, to January 1, 1927	
Forestry Division advance.....	\$ 583.55
United States Warrant.....	4,526.86
Interest on Daily Balance.....	4.38
	<u>\$ 5,114.79</u>

DISBURSEMENTS

January 1, 1926, to January 1, 1927	
Forestry Division Refund.....	\$ 485.94
Loan Forestry Division.....	3,500.00
	<u>\$ 3,985.94</u>

RECEIPTS

January 1, 1927, to January 1, 1928	
Interest on Daily Balances.....	\$ 56.40
Loan Forestry Division Repaid.....	3,500.00
	<u>\$ 3,556.40</u>

DISBURSEMENTS

January 1, 1927, to January 1, 1928	
Loan Forestry Division.....	\$ 3,000.00
Purchase of Land.....	1,501.75
	<u>\$ 4,501.75</u>

SUMMARY

January 1, 1926, Bank Balance.....	5,114.79
January 1, 1926, to January 1, 1927, Revenues.....	5,114.79
	<u>3,985.94</u>
January 1, 1926, to January 1, 1927, Disbursements.....	1,128.85
Balance.....	3,556.40
January 1, 1927, to January 1, 1928, Revenues.....	4,685.25
January 1, 1927, to January 1, 1928, Disbursements.....	4,501.75
January 1, 1928, Bank Balance.....	<u>\$ 183.50</u>

FINANCIAL STATEMENT
DEPARTMENT OF CONSERVATION
WILD LIFE REFUGE

RECEIPTS		RECEIPTS	
January 1, 1926, to January 1, 1927		January 1, 1927, to January 1, 1928	
Interest on Daily Balances.....	\$ 88.00	Interest on Daily Balances.....	\$ 32.62
Commission Account.....	6,576.75	Commission Account.....	2,541.33
Salaries Refunded.....	2,428.50	Salaries Refunded.....	133.32
Contingent Funds Returned.....	600.00		
Rent.....	62.50		
Sale of Boat "Alert".....	3,500.00		
Refund Agents' Expenses.....	23.30		
Refund Fish, Game and Oyster Division.....	1,973.00		
	<u>\$ 15,252.05</u>		

DISBURSEMENTS		DISBURSEMENTS	
January 1, 1926, to January 1, 1927		January 1, 1927, to January 1, 1928	
Office Expense and Supplies.....	\$ 1,330.20	Office Expense and Supplies.....	\$ 258.77
Agents' Salaries.....	15,212.15	Agents' Salaries.....	1,155.72
Expense and Supplies.....	3,786.33	Expense and Supplies.....	711.86
Engine Launch "Opelousas".....	1,973.00	Launch Repairs.....	7.25
Louisiana Fish Industries, Inc.....	353.05		
Launch Repairs.....	271.10		
	<u>\$ 22,925.83</u>		<u>\$ 2,133.60</u>

SUMMARY

January 1, 1926, Balance.....	\$ 8,029.73
January 1, 1926, to January 1, 1927, Revenues.....	15,252.05
	<u>23,281.78</u>
January 1, 1926, to January 1, 1927, Disbursements.....	22,925.83
Balance.....	355.95
January 1, 1927, to January 1, 1928, Revenues.....	2,707.87
	<u>3,063.82</u>
January 1, 1927, to January 1, 1928, Disbursements.....	2,133.60
January 1, 1928, Balance.....	<u>\$ 930.22</u>

FINANCIAL STATEMENT
DEPARTMENT OF CONSERVATION
MINERALS DIVISION

RECEIPTS

January 1, 1926, to January 1, 1927

Refund from Clay Survey Fund.....	\$ 355.40
Sale of Maps.....	109.20
State Appropriation.....	87,500.00
Checks Voided.....	593.50
Interest on Daily Balances.....	194.73
Advance, Clay Survey Fund.....	3,652.62
	\$ 92,405.45

RECEIPTS

January 1, 1927, to January 1, 1928

Sale of Maps.....	\$ 168.30
State Appropriation.....	108,333.31
Checks Voided.....	436.26
Interest on Daily Balances.....	224.33
Carbon Black Survey Collection.....	1,168.44
Contingent Funds Returned.....	200.00
	\$110,530.64

DISBURSEMENTS

January 1, 1926, to January 1, 1927

Superintendent and Office Salaries.....	\$ 26,274.20
Office Expense.....	6,509.06
Agents' Salaries.....	25,312.98
Agents' Expense.....	16,343.98
Autos Purchased.....	3,931.45
Petty Cash Fund.....	250.00
Contingent Fund.....	200.00
Black, Clear and Sabine Lakes Survey.....	2,058.31
Bayou De Siard Survey.....	291.10
Clay Survey Fund account.....	8,587.41
Fish, Game and Oyster Division.....	481.67
Purchase of Launch "Tarpon".....	2,000.00
State Appropriation.....	6,250.00
	\$ 98,490.16

DISBURSEMENTS

January 1, 1927, to January 1, 1928

Superintendent and Office Salaries.....	\$ 26,093.48
Office Expense.....	9,720.09
Agents' Salaries.....	26,166.77
Agents' Expense.....	15,328.73
Autos Purchased.....	5,142.84
Contingent Funds.....	200.00
Clay Survey Fund account.....	13,366.76
Fish, Game and Oyster Division.....	4.11
Purchase of Launch "Ferol".....	12,000.00
Flood Relief Expense.....	23.23
Carbon Black Survey Expense.....	2,336.89
Launch Repairs.....	48.70
Transfer of Bank Balance from Clay Survey.....	3.34
	\$110,434.94

SUMMARY

Bank Balance, January 1, 1926, Minerals Division.....	\$ 5,974.63
Bank Balance, January 1, 1926, Clay Survey Fund.....	5,182.38
Receipts, January 1, 1926, to January 1, 1927.....	4,905.45
State Appropriation.....	87,500.00
Total Receipts.....	103,562.46
Less: Disbursements, January 1, 1926, to January 1, 1927.....	98,490.16
Bank Balance, January 1, 1927.....	5,072.30
Receipts, January 1, 1927, to January 1, 1928.....	2,197.33
State Appropriation.....	108,333.31
Less: Disbursements, January 1, 1927, to January 1, 1928.....	115,602.94
Bank Balance, January 1, 1928.....	110,434.94
Bank Balance, January 1, 1928.....	\$ 5,168.00



ROGERS PRINTING COMPANY
610 BIENVILLE STREET
NEW ORLEANS, LOUISIANA



C0-ALP-575

